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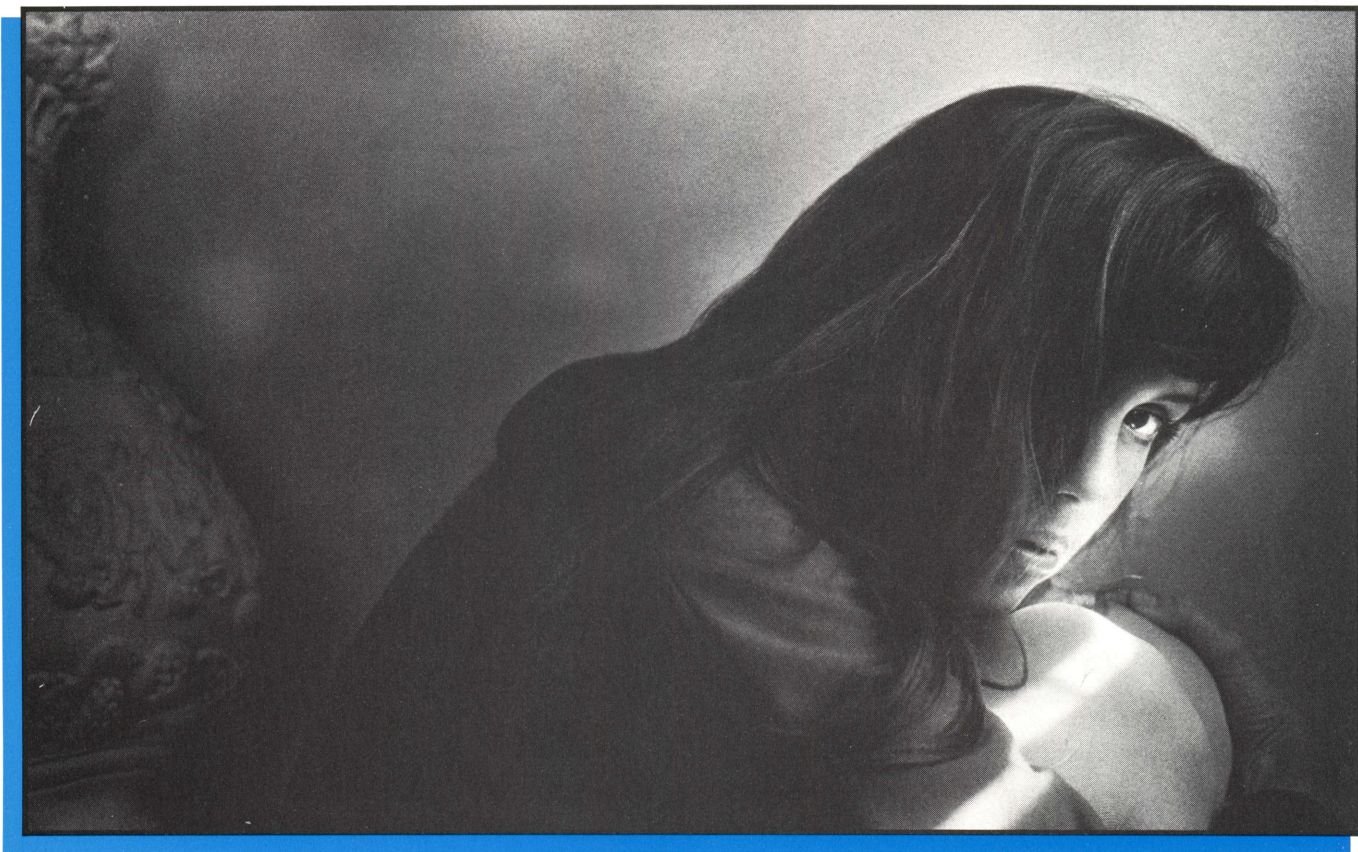
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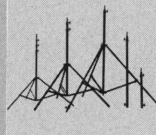
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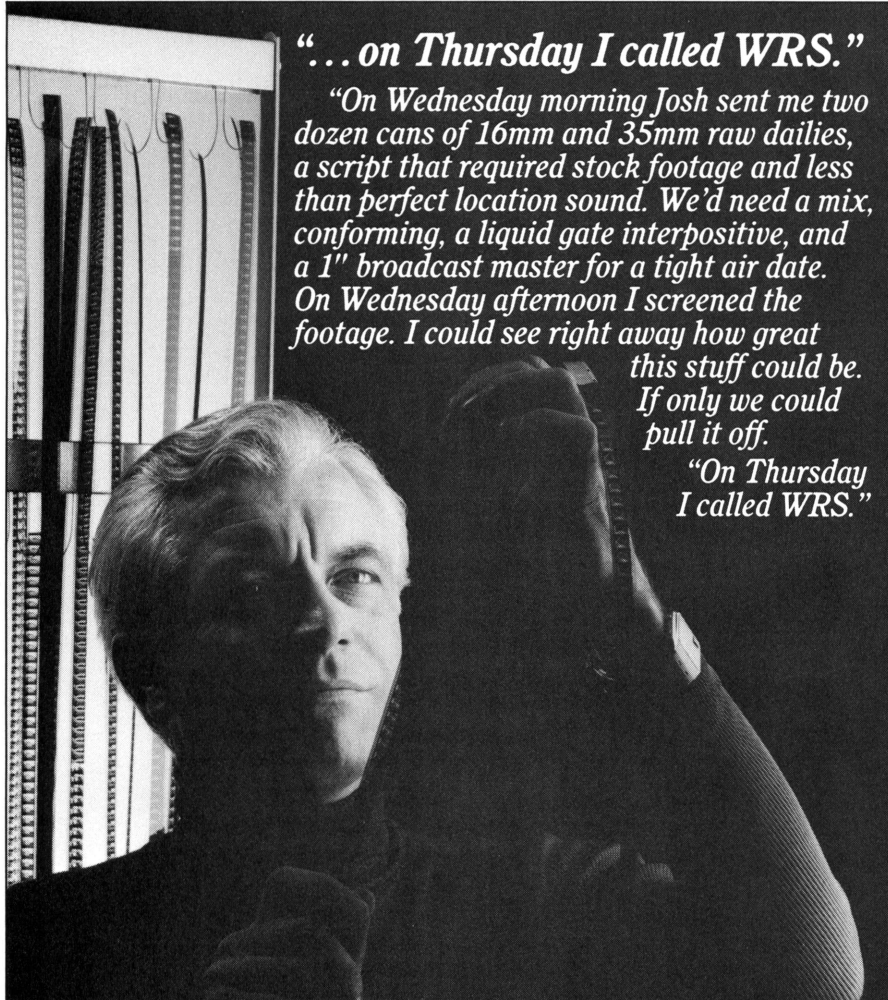
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Sean Joyce's matte painting of the Planet Fyrine IV completes the illusion of an alien world for *Enemy Mine*



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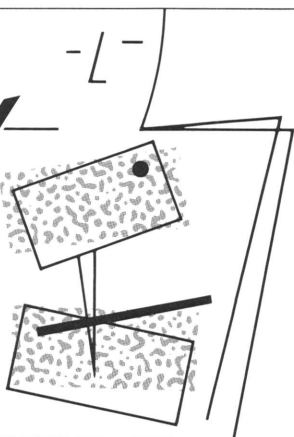


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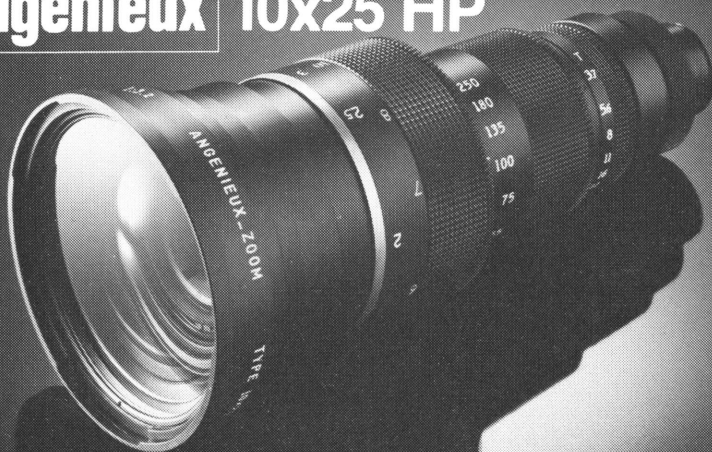
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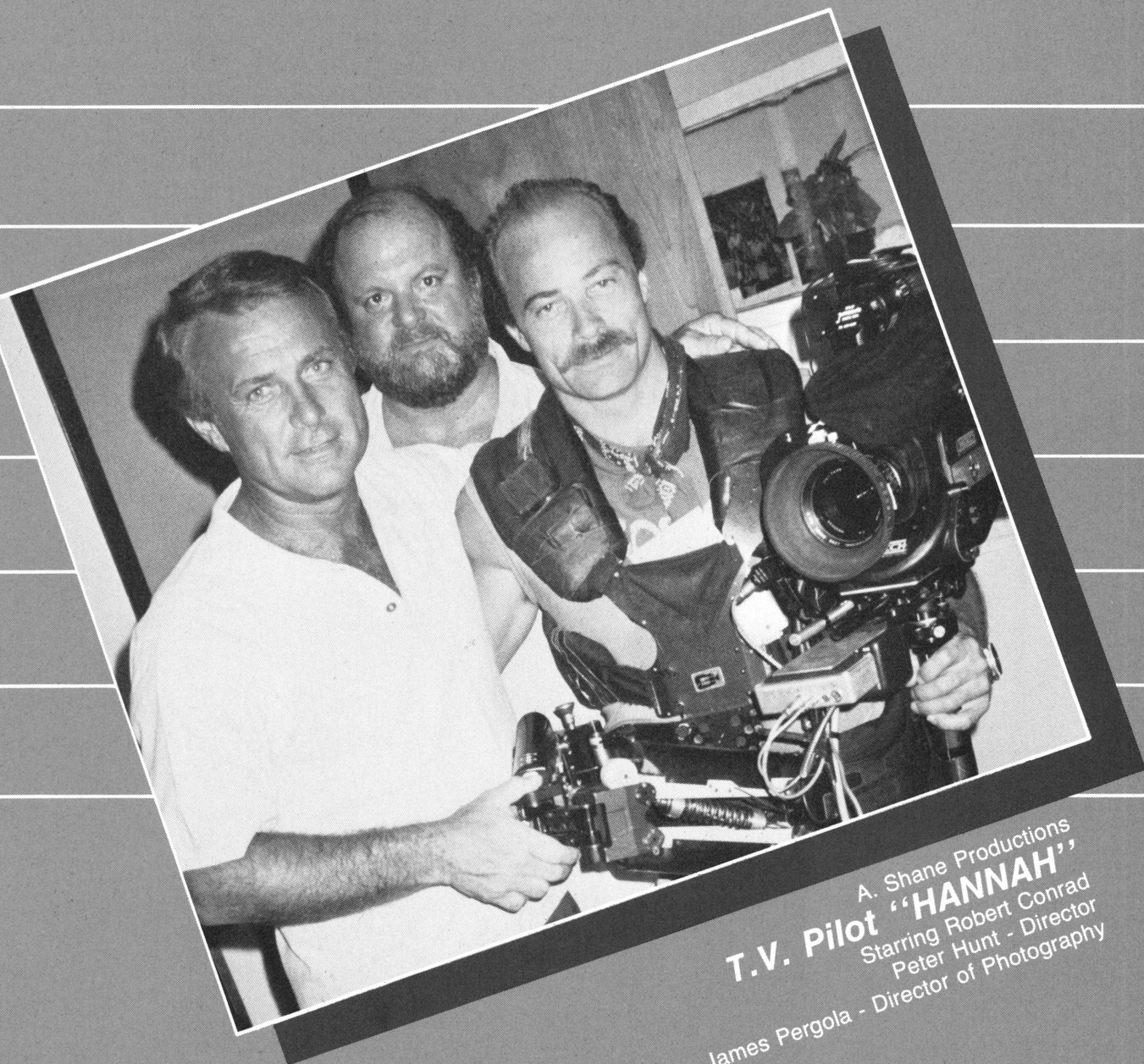
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Letters

Of Merlin . . .

A few days before Rock Hudson died, in a blaze of publicity, tears and high-mindedness which lit up the media everywhere, Bill Abbott – the "L.B. Abbott" of so many film credits and an astonishing number of Academy Award nominations and winner of four Oscars and four Emmys, also died. He was 77 and his death rated a nice one-column obituary in the trade papers. He was not a star.

But if movies are magic, Bill Abbott was Merlin. He was one of the great special effects wizards and it's probable that what he did in his long and productive career brought more "oohs" and "aahs" and lit up more eyes in wonder than any of the beautiful people whose passing makes the world weep and cameras grind. To be sure, there was nothing titillating about the way he left, he had lived a long time and, in the course of his work had suffered many a crippling injury. Billy did his own stunts, so to speak. When the stunt doubles for the famous are doing their dangerous, breath-taking numbers, there are always cameramen who, to get the really terrific shot, risk their lives too – mostly without hazard pay. Billy was one of those. To get the shot, he took the risks himself and sometimes he lost. After a picture called *Flight Of The Phoenix*, he was bent a little and walked more slowly than before the accident. I think some people were killed on that one – and Bill counted himself lucky not to have been one of those.

Special effects is one of those mysterious trades which confound the Great Ones. Powerful agents, imperious studio bosses and Wagnerian directors and actors don't challenge special effects people – mostly because they don't know what they're being told. This has, over time, led to some talented special effects impresarios who

may or may not be gifted at the trade itself but who are geniuses at compelling vast sums into and out of the bloated budgets of the dazzling "effects" pictures of recent years. The power people of The Industry rarely have any interest in the technical and hands-on aspects of the way movies are made – and since the advent of the laser and the computer-controlled camera, they don't even pretend any more. They just sign the checks and never know. If the picture hits – what the hell, it must be worth it.

Bill Abbott was not one of those. He referred to himself as a "paper-clip and rubber band" kind of special effects man, and if he was working with you on a picture, he'd be glad to explain anything. Didn't care a damn about the mystique. In fact, he took a special pride in simplicity and if there was a simpler way to do it – something without all the hardware and the electronics – that's the way Bill would do it, if you let him. It was a remarkable part of this remarkable man that he never stopped learning, never stopped admiring what talented people did and never once suggested to anyone that what he had done may have made the difference. I have heard hairdressers refer to a movie in which they worked as "my picture" but not Bill. Not on such effects marvels as *Towering Inferno*, or *Fantastic Voyage* or *Doctor Dolittle* or *The Poseidon Adventure* or – but the list fills pages.

It's a familiar cliché to point to the fact that there are at least two Hollywoods – but that the vast public really knows and cares only about the one where the shine and glitter and big bucks and steaming scandals rise. But while actors may and should be what people remember, they don't make the pictures, they ornament them. All movies are magic, I suppose – but the

continued

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“We had four days
to shoot the
Skycam sequence—actors
on wires flying over the
carnival. On the fourth
day, with three shots to go,
we lost our sunlight.”

Couldn't wait for sunlight

That's Steve Poster talk-
ing. He was Director of
Photography on *The Boy
Who Could Fly*, shot on
location in Vancouver. “At
the end of that day the
carnival rides were going
to leave and the Skycam
was booked for another
job. There wasn't time to
build towers and rig arcs.”

“The carnival ground was
about two hundred by four
hundred feet,” says Mr.
Poster. “And we had estab-
lished it in full sunlight.
We still needed wide
angles. And we needed to
light out the wires.”

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“So we used the Musco
Light rig as a hot backlight,
about two hundred fifty
feet away. For each shot, I

could put it *exactly* where
I wanted in minutes. It
looked just like sunlight.”

“It's not
how bright it is.
It's what you
can do with it.”

Controlled from camera position

“Before we lost the sun,
Gaffer Jim Planette and I
had used the Musco as
sunlight fill. It was
astounding to look at the
shot from camera position
and adjust the various
lights with the remote con-
trol. *A little more
spread here, a little less
fill there...* It's not how
bright it is—it's what you
can do with it.”

Saved money

“When the sun disappeared,
the Musco saved the
most important sequence in
the movie” says Mr.
Poster. “And it saved the
production a bundle.”

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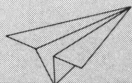
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most special kind of magic must be the creation of what cannot exist except by the manipulation of illusion. Special effects is photographing what isn't there and matching it into what is so that if your mind tells you it's impossible – still your eye sees and your heart lifts.

The actor makes up his or her face and is transformed. The actor looks in the mirror and /s magic. The effects wizard deals totally in illusions but he cannot entertain them because what he does is ferociously practical – to achieve the look of dreams. I am one of the many producers, some of them very famous, who worked with Bill over the years, learned from him and benefited from his talent. I was one of the smaller and more select group who counted Bill and Muriel as personal friends, and in the long months – sometimes years – between professional associations, we'd see each other at screenings, industry functions and just plain gabfest lunches. He was a great raconteur, slow spoken and deliberate, but he remembered all the funny and crazy things that happen on sets and would relate them, over those lunches, in his wry way – mocking without venom. In a world and community where the stories about pictures are often far more hair-raising than the pictures themselves and where people routinely do things that shake the foundations of sanity, Bill looked, shook his head a lot but rarely condemned anyone.

He was a wonderful man and a lot of us will miss him. He was a wonderful talent and millions upon millions who don't know his name will, without ever knowing it, miss him too.

—Saul David

Van Nuys, CA

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The Bookshelf

by George L. George

Christopher Finch's definitive work, **The Art of Walt Disney**, is re-issued in its original sumptuous, large format edition at a notably reduced price. It combines a lavish presentation – 763 magnificently reproduced illustrations, including 321 full color plates and 12 fold-outs – with an extensive study of Disney's career and animation techniques (*Abrams, NYC, \$29.95*).

Barbara Leaming's **Orson Welles** draws a fascinating portrait of the uncommonly gifted artist. Exceptionally well-researched and with full access to Welles himself and his personal documents, it reveals the boundless scope of his achievements and offers an insightful interpretation of a complex man whose troubled childhood affected his entire life (*Viking, NYC, \$19.95*).

A perceptive assessment of a director who made a successful transition from television to films, Erwin Kim's **Franklin J. Schaffner** stresses his decisive impact on and total involvement in every aspect of his films' production. Kim holds that such dissimilar movies as *Planet of the Apes*, *Patton* and *Yes, Giorgio* are examples of Schaffner's versatility, technical resourcefulness and visual imagination (*Scarecrow, Metuchen, NJ, \$35*).

Five top Australian directors discuss with Sue Mathews, in **35mm Dreams**, the resurgence of domestic movie production, its causes and future, and the part they themselves expect to play in formulating and carrying out their creative contribution (*Penguin, NYC, \$8.95*).

Martyn Auty and Nick Roddick assemble in **British Cinema Now** an informed assessment of the upbeat mood of Britain's film industry buoyed up by *Chariots of Fire* and other successful movies. Their forecast is cautiously optimistic, with crossed fingers the order of the day (*Indiana U. Press/BFI, Champaign, IL, \$21.95/10.95*).

Howard Hughes's love affair with the movies is told by Terry

Thomas in a lively documented book, **Howard Hughes in Hollywood**. From 1925 on, Hughes produced some 50 movies including *Hell's Angels* and *Scarface*, discovered Jane Russell, ran RKO Studios and bedded actresses by the score before giving up his connection, but not his fascination with Hollywood (*Citadel, Secaucus, NJ, \$17.95/9.95*).

A uniquely American form of popular culture – the musical comedy – is a hybrid genre that found its most scintillating expression on stage and in films. This interdependence is enjoyably shown in two splendid, complementary large format books: **Hollywood Musicals** by Ted Sennett and **Broadway Musicals** by Martin Gottlieb. Both celebrate in informative and highly readable texts and hundreds of color and b&w photographs these lavishly produced song-&-dance spectacles (*Abrams, NYC, \$24.95 ea.*).

Twelve American film comedies of the 30s are perceptively scrutinized by Gerald Weales in **Canned Goods as Caviar**. He probes the comedic techniques of leading performers, treating their films as reflections of their times rather than timeless works of art, while inviting us to "open the can and sample the caviar" (*U. of Chicago Press, Chicago, IL, \$35/12.95*).

Nearly 1000 screen classics of every genre and origin are discerningly re-evaluated in **The Connoisseur's Guide to the Movies** by distinguished film critic James Monaco. He supplements the customary plot summaries and cast-&-credits lists with refreshingly unorthodox and wittily urbane comments that reveal the filmmakers' deeper concerns (*Facts on File, NYC, \$16.95/9.95*).

In their stimulating study of film history, Profs. Robert C. Allen and Douglas Gomery probe the academic approach to the subject. **Film History: Theory and Practice** challenges as inappropriate the film historians' current

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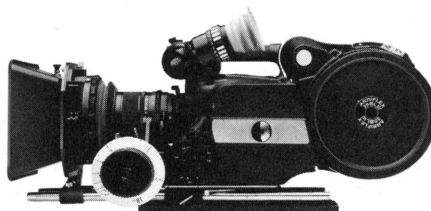
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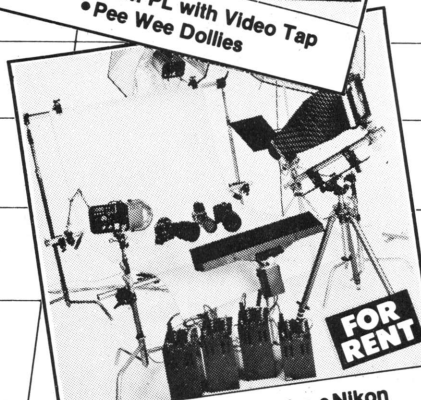
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methods, philosophical orientation, evidence and conclusions (*Knopf, NYC, \$12*).

Originally published in 1976, Garth Jowett's **Film: The Democratic Art** is re-issued as a timely reminder of the impact on society of the mass media, and of the need to continually scrutinize the changing face of American culture (*Focal Press, Stoneham, MA, \$19.95*).

Knowledgeably edited by Anthony Slide, **International Film, Radio and Television Journals** is a unique catalog of American and foreign visual media periodicals. Some 500 magazines from 23 countries are surveyed, providing an invaluable reference source for scholarly research (*Greenwood, Westport, CT, \$49.95*).

The first issue of a new directory edited by Louis Nicolaidis, **The Production Company/CA** is an extensive source book of California facilities and personnel, listing commercial/industrial firms specializing in live action, animation, special effects, jingles and music videos (*Production Books, 1454 N. Seward St., Hollywood, CA, \$17.95*).

A lively combination tourist guide and film history, Richard Allman's **The Movie Lover's Guide to Hollywood** describes some 300 local film-related sites as well as many other attractions (*Harper & Row, NYC \$12.95*).

A new title in Focal Press's excellent "Media Manuals" series, **Motion Picture Film Processing** by Dominic Case is a comprehensive manual of high technical standing. Its explicit text, supported by numerous illustrations, covers the physical and chemical properties of raw stock at each stage of processing (*Focal Press, Stoneham, MA, \$14.95*).

Now available in paperback, Richard Schickel's masterful biography, **D. W. Griffith: An American Life**, explores in depth the pioneer director's persona and contribution to film art, and his inability to adapt to the industry's changing patterns (*Simon & Schuster, NYC, \$12.95*).

A film director's pursuit of aesthetic goals is examined in Dale Silvira's study, **Laurence Olivier and the Art of Film Making**. The author considers director Olivier's ethical assumptions and values, as well as his

consistent visual approach, his cinematic style, and his own particular use of actors, montage, music, etc. (*Fairleigh-Dickinson U. Press, Cranbury, NJ, \$39.50*).

A comprehensive source book, **The Lively Arts information Directory** encompasses film, television, radio, as well as theatre and dance. The fully revised 2nd edition provides factual details on more than 9000 organizations of all kinds functioning in the field. Edited by Steven R. Wasserman and Jacqueline Wasserman O'Brien, this is a well-organized reference work (*Gale, Detroit, \$165*).

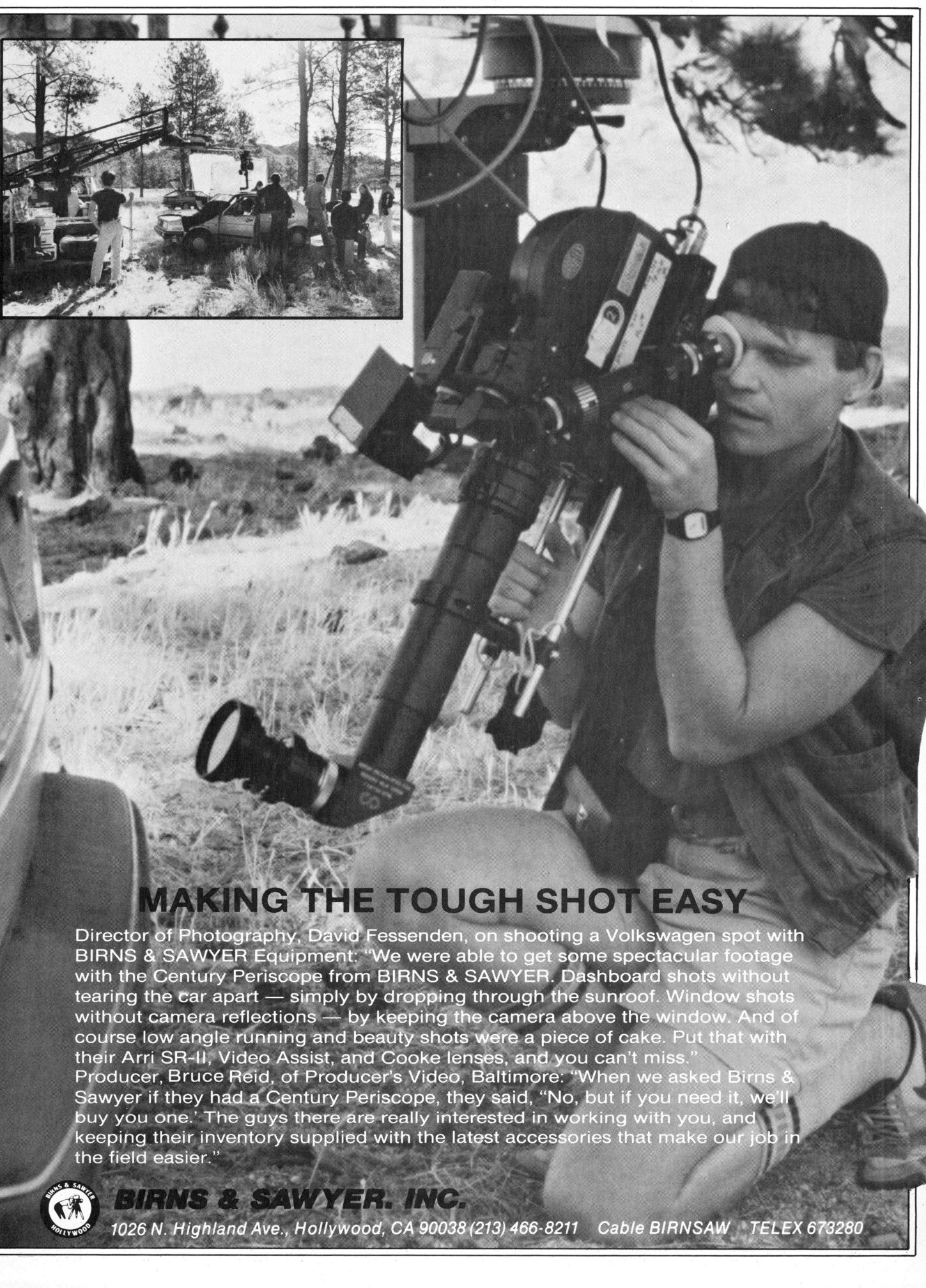
Film critic Pauline Kael's **5001 Nights at the Movies**, now an expanded paperback, contains an incredible number—several thousands—of her condensed reviews that appeared originally in *The New Yorker*. A stimulating compilation in which Kael dispenses freely her witty and well-informed opinions (*Holt Rinehart Winston, NYC, \$12.95*).

A scholar's bonanza, Philip J. Riley's **London After Midnight** reconstructs with great skill Lon Chaney's famous film, unfortunately lost to posterity. The book includes the film's script, a complete visual continuity of enlarged frames and titles, as well as fascinating memorabilia (*Cornwall Books, Cranbury, NJ, \$24.50*).

In **The Best of "Rob Wagner's Script,"** Anthony Slide selects essays by such Hollywood notables as Charlie Chaplin, Lillian Gish, Tom Mix, Ernst Lubitsch, Dalton Trumbo and others. Their articles, dealing with movies, art, literature and politics, appeared in *Rob Wagner's Script*, a small, intellectual magazine published in Beverly Hills during the 30s and 40s, and viewed then as a non-conformist antidote to the pervasive middle-class mentality (*Scarecrow, Metuchen, NJ, \$15*).

The versatile personality of Goldie Hawn, Oscar-winning actress and successful producer, is scrutinized in Peter Haining's upbeat biography, **Goldie**. He narrates skilfully the life and career of the quintessential "dumb blonde" who parlayed her looks and talent from go-go dancing to sensitive acting (*Merrimack, Salem, NH, \$16.95*).

△



MAKING THE TOUGH SHOT EASY

Director of Photography, David Fessenden, on shooting a Volkswagen spot with BIRNS & SAWYER Equipment: "We were able to get some spectacular footage with the Century Periscope from BIRNS & SAWYER. Dashboard shots without tearing the car apart — simply by dropping through the sunroof. Window shots without camera reflections — by keeping the camera above the window. And of course low angle running and beauty shots were a piece of cake. Put that with their Arri SR-II, Video Assist, and Cooke lenses, and you can't miss."

Producer, Bruce Reid, of Producer's Video, Baltimore: "When we asked Birns & Sawyer if they had a Century Periscope, they said, 'No, but if you need it, we'll buy you one.' The guys there are really interested in working with you, and keeping their inventory supplied with the latest accessories that make our job in the field easier."



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Arri BL I w/400' Magazine (T)	\$20,625.00
Arri BL II w/400' Magazine (T)	\$28,125.00
Arri IIC w/Var. Speed Motor (T)	\$ 3,450.00
Arri BV w/Var. Speed Motor	\$ 3,500.00
Arri II BGS w/Constant Speed Motor	\$ 3,500.00
Arri II BVGS w/Constant Speed Motor	\$ 4,950.00
CP XR-35 w/Crystal Motor, 3-1000' Mags	
6-Super Baltar Lenses	
2-Batteries w/Charger	
Worral Gear Head	
Standard Mitchell Legs, Cables & Cases	\$23,500.00
Mitchell BNCr w/Crystal Motor	
2-1000' Mags	
6-Super Baltars, 25 to 250 Angenieux	
Motorized, Cables & Cases	\$21,500.00
Mitchell BNC w/220V Sync Motor,	
4-1000' Magazines	
28, 40, 50, 75 Baltar Lenses	
Matte Box, Finder, Cables & Cases	\$17,500.00
Mitchell BNCr w/Crystal Motor (T)	\$ 7,125.00
Mitchell NC (Plate Camera)	\$ 4,995.00
Mitchell GC	\$ 5,500.00
B&H Eyemo 71KM w/Filter Slot - New	\$ 1,995.00
B&H Eyemo Sing. Lens, Open Back,	
Motor Mounts - Like New	\$ 995.00
B&H Eyemo Spyder w/50, 75, 100mm Lenses,	
Reflex Finder	\$ 895.00
B&H Eyemo (Traid) Sequence Camera w/Motor	
12-48 fps	\$ 1,195.00
70mm Mitchell FC 5 Perf. Rackover	\$10,500.00
70mm Mitchell FD 10 Perf.	\$10,500.00

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	Sale Price
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25-250 Angenieux BNCr Mt (T)	\$ 4,125.00
20-120 Angenieux Arri Mt (T)	\$ 6,000.00
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Jack Frost 25-250 Zoom Housing (T)	\$ 495.00
9.5-57 Angenieux Neutral Mt, New	\$ 3,945.00
9.5-57 Angenieux CA-1 Mt	\$ 2,995.00
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12-240 Angenieux Arri Mt	\$ 4,995.00
12.5-75 Angenieux w/ 16BL Housing	\$ 1,995.00
17-70 Pan Cinor Arri Mt	\$ 395.00
17-85 Pan Cinor Arri Mt	\$ 495.00
12-120 Angenieux CA-1 Mt	\$ 950.00
9.5-95 Angenieux w/AV30 Finder "C" Mt	\$ 1,995.00
12-120 Canon-Macro "C" Mt	\$ 1,995.00

CAMERA ACCESSORIES

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Arri 16 BL 1200'	\$ 1,295.00
Arri 35 BL 400'	\$ 1,875.00
Arri 35 BL 1000'	\$ 1,875.00
CP XR-35 1000'	\$ 200.00
Mitchell 16 x 400'	\$ 225.00
Mitchell 16 x 1200' (Rebuilt Like New)	\$ 595.00
Mitchell Std. 35 x 1000' (T)	\$ 295.00
Mitchell Std. 35 x 400' (T)	\$ 225.00
Mitchell BNCr 35 x 1000' (T)	\$ 150.00
Bell & Howell 16 x 400'	\$ 295.00
Bell & Howell 35 x 200'	\$ 295.00
Bell & Howell 35 x 400'	\$ 250.00
Bell & Howell 35 x 400' Fiber	\$ 75.00
Bell & Howell 35 x 1000'	\$ 225.00
Bell & Howell 35 x 1000' Bi-Pack	\$ 795.00

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Arri 16 Torque Take-Up	\$ 395.00
Arri 35 Variable Speed (T)	\$ 300.00
Arri 35 Constant Speed (T)	\$ 300.00
Mitchell 16 Variable Speed	\$ 495.00
Mitchell 16 High Speed	\$ 695.00
Mitchell 35 Variable Speed	\$ 495.00
Mitchell 35 High Speed	\$ 795.00
Bolex ESM Sync Motor	\$ 695.00

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Mitchell Mark II Blimp (Excellent)	\$ 4,500.00
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Arri 16M Blimp, Fiber Glass	\$ 1,495.00
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16mm Cinema Products G5MO w/9.5-57	
Angenieux, 2-400' Magazines, 2-Batteries w/Charger, Shoulder Support	\$ 9,995.00
16mm Aaton w/12 to 120 Angenieux, 2-400' Magazines, 2-Batteries, Charger, Handgrip & Case	\$14,500.00
16mm Mitchell Prof. w/4 Baltar Lenses, Wild Motor, Hi-Speed Motor, 3-400' Magazines, Viewfinder, Matte Box, Cables & Cases	\$ 6,500.00
16mm Bolex Rex V w/16-100 Vario Switar POE	
1-400' Magazines, Torque Motor, MST Motor w/Power Pack, Cables & Case	\$ 1,995.00
16mm Bolex EBM w/16-100 Vario Switar POE	
Electric Handgrip, Base Adapter, Cables & Case	\$ 2,495.00
16mm Bolex EMB w/17-85 Pan Cinort, 400' Magazine, Torque Motor, Sync Generator, Electric Handgrip	\$ 2,495.00
16mm Bolex EBM w/Electric Handgrip	\$ 1,495.00
Beaulieu R16B Body	\$ 595.00
16mm Beaulieu R16B w/12 to 120 Auto Iris 200' Mag & Case	\$ 1,495.00
16mm EK Cine Special I w/100' Magazine	\$ 295.00
16mm EK Cine Special II w/100' Magazine	
15mm, 25mm, 63mm, 63mm Lenses	\$ 495.00
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16mm Kodak K-100T w/25mm 0.95 Lens (Like New)	\$ 795.00
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16mm Mauer 05 w/400' Magazine	\$ 1,695.00
16mm Eclair NPR w/Beala Motor, 2-400' Magazines	\$ 4,995.00
16mm Eclair NPR Body w/finder	\$ 2,995.00
Acme V w/Lens, T.V. & Dissolve	\$ 6,100.00
16mm Sampson-Hall Housing w/Filmo & 13mm Lens	\$ 2,995.00
16mm Milliken DBM-5 Bet w/12-120 Angenieux Lens, 28V DC, 24, 48, 64, 128, 250, 500fps	\$ 2,995.00

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Acme Camera, Totally Rebuilt to "Like New" Condition	\$44,000.00
Oxberry 35mm Film Strip, Slide Film Complete	
Animation Stand w/Camera, Follow Focus Compound, Top & Bottom Lights, Excellent	\$14,500.00
FAX Senior Stand, Complete, Rebuilt, Excellent	\$ 7,500.00
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35mm Bell & Howell 2709 High Speed	\$ 1,350.00
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35mm Wall Double Perf.	\$ 895.00
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Richardson 35-4BHR-4	\$ 2,886.00
Richardson 35-8BHR	\$ 2,886.00
Richardson 35-8BH-8	\$ 3,292.00
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Richardson 70-13MS-13	\$ 2,250.00
Richardson 70-14MS-14	\$ 2,250.00
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	Sale Price
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New Price \$3,880	Used Only \$ 1,940.00
(1 Pr.) Simplex XL 35mm Projectors, w/Forward & Reverse, RCA Mag/Optical Interlock Sound Heads, Electric Changeover, Motorized 2000' Take-Up Magazines, Xetron 4000 Watt Lamphouses, (Vertical Bulb for Lower Wattage, if Needed), Simplex Pedestals. New \$30,000.00	
Excellent Used (1 Pr.)	\$18,000.00
(1 Pr.) Simplex XL 35mm Projectors, w/IPC Simplex Sound Heads, Simplex Pedestals, No Lamphouses, Overhauled and Rebuilt, (1 Pr.)	\$ 9,995.00
1 ea. Century Model MDA 35mm Projector w/Century Sound Head, Model MR-3-G, Pedestal, No Lamphouse or Magazines. Fully Rebuilt, Excellent	\$ 4,450.00
Tower Film Transport, 2-hr. 40 min. Capacity	\$ 3,500.00
35mm Goldberg Booth Rewind	\$ 695.00



Used 35mm Proj. Lenses & Anamorphics Available.

16MM PROJECTORS

	Sale Price
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Bell & Howell Specialist, Optical Sound, Excellent	\$ 695.00
Elmo 16 CL Xenon Demo, New \$2,900	\$ 1,795.00
Bell & Howell Jan Optical Sound	\$ 595.00
Bell & Howell Jan Optical Sound	\$ 325.00
Graflex Mod 940 Xenon - Very Low Hours	\$ 795.00
Graflex Mod 815 Optical Sound	\$ 395.00
Siemens Double Band Interlock (Playback Only)	\$ 1,395.00
Kodak Analyst w/Control (Excellent)	\$ 695.00

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	Sale Price
Moviola K-20 16mm Viewer-Motorized	\$ 595.00
Moviola L-20 16mm Viewer w/TU Arms Motorized	\$ 895.00
Moviola UL-20-CS Upright w/TU Arms	\$ 2,195.00
Zeiss Moviescop Viewer	\$ 249.50
Bell & Howell Filmation Viewer	\$ 99.50
16mm Maier Hancock Splicer	\$ 495.00
16/35 Maier Hancock Splicer	\$ 495.00
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New Replacement Cost \$21,705.00 This Unit \$13,950.00

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Magnasync 3116-E-3 16mm Recorder/Reproducer Rack Mounted w/Interlock Motor
Magnasync 3116-E-33 16mm Triple Reproducer Rack Mounted Interlocked
Magnasync G962 Mixing Console w/"Counter Intelligence Counter" & Distributor Remote Control
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16MM/35MM WET GATE SYSTEM FOR Acme Projector. Forward, reverse, stop motion, freeze frame, continuous/high speed to 500 fps, normal 240 fps. Fixed pin registration with threading latch for easy loading. Regulated pump-fed closed support system consisting of: two pumps, reservoir, controls, valves, gauges, cabinetry. Complete system includes: 16MM & 35MM WET GATE for Acme & Support System.
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Kaleidoscope, New from Grass Valley

Grass Valley Group announces the introduction of the Kaleidoscope™ DPM-1 Digital Effects System. The new system provides unequalled flexibility in the creation of effects, combined with simple and rapid access to effects for real time use. Up to five channel effects may be created with multi-channel systems, and systems may be configured to allow assignment of channels among as many as four control positions.

The Kaleidoscope video processor has a full 4:2:2 signal path, and the key path has full luminance resolution. NTSC systems include a hybrid, adaptive decoder for best possible picture quality, and PAL systems use an external adaptive decoder.

The DPM-1 can select dynamically both video and key inputs during an effect, and allows selection of two videos (front and back) and two associated key signals in each key frame. A key source selector is available, and video selection may be made either by interface to auxiliary buses of the GVG 300 Series switcher, or by an optional video source selector. Full integration with Grass Valley Group's 300 production switcher is standard, and an optional tally interface is available for other switchers. The Kaleidoscope control panel may be mounted in the 300 Series production switcher control panel, or in a table top mount.

The Kaleidoscope DPM-1 performs translation, rotation, scale and perspective transformations, and uses a novel architecture which allows unprecedented flexibility in the creation of effects. Some effects previously possible only by multipass (or not possible at all) are included in the repertoire of a single channel DPM-1.

The DPM-1 can accept Composite Video and Analog Component (R, R-Y, B-Y and R,G,B) and SMPTE/EBU parallel digital component signals. Input



types may be mixed, and the input format will be accommodated automatically. Analog component, digital component and composite outputs are available at all times. The kaleidoscope system will be usable with analog component or digital component systems, and can efficiently accommodate individual pieces of component equipment in a composite environment.

For further information contact The Grass Valley Group, P.O. Box 1114, Grass Valley, CA 95945. (916) 273-8421.

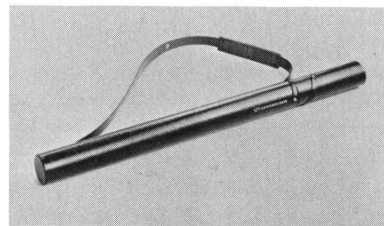


TC-1 Time Code Reader

The Dcode™ TC-1 is a low cost time code reader for general film and video applications. In film, using time coded film dailies, editors can use the TC-1 to assist them in syncing dailies, making high speed searches, logging, and keeping accurate time-date records of the actual production. The TC-1 reads SMPTE or EBU time code from 1/10th to 15 times speed in both forward and reverse from VTRs, VCRs, film editing machines and film synchronizers.

For transferring 1/4-inch tape to mag film, it reshapes code for film-to-tape transfers, and simultaneously displays code and generates 60Hz sync pulse at 24 and 30 fps. The unit is compact (1.6 x 6 x 5 inches, 1.5 lbs.). A parallel port for a computer interface is optional.

For more information, contact: Denecke, Inc., 5417-B Cahuenga Blvd., North Hollywood, CA 91601, (818) 766-3525.



Microphone Carrying Case

Providing a practical method for both protection and transport of the Sennheiser, model ME 88 spot microphone, the MZK 88 will hold the ME 88 when assembled with the K3U powering module. The integral shoulder strap allows the carrying case to be conveniently worn on the shoulder, or hung from the belt.

Total weight, including ME 88 plus K3U, is approximately 550 g (19 ozs). Overall dimension: Approximately 735 mm (28 15/16 in.) in length by 56 mm (2 3/16 in. in diameter).

For additional information, please contact Sennheiser Electronic Corporation (N.Y.) 48 West 38th Street, New York, New York 10018.

New Model 53 Tripod

The O'Connor Model 53 Tripod Dolly is especially developed for the television industry with the advantages of tracking, steering, and crabbing for a tripod at a fraction of the cost of a studio dolly.

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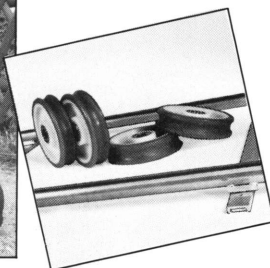
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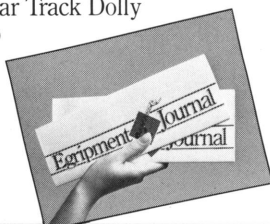


STAR TRACK DOLLY

The Egripment Startrack Dolly with a total weight of 18 kg (39,6 lbs) has been developed for the film and video maker who requires a simple and effective method of tracking, without large bulky objects in transit.

The Egripment Star Track Dolly will allow passage through most doors.

The Star Track Dolly allows you to make very low angle shots. The



rubber wheels may be easily exchanged for track wheels which can be used on almost every track.

The total star-track unit folds in an easy carry bag.

Sizes only 0,2 x 0,7 x 0,6 mtr.

Star Track Dolly: Easy to handle.

Ask for detailed information:

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Holland, Telex 10254 grima nl.
Phone 00 31 2945 39 88.



It features a new O'Connor developed inclined wheel that has a fluid feel motion while traversing almost any studio or location surface. Each wheel has its own individual internal brake, 6" diameter replaceable urethane tires and a wrap around cable guard.

The Model 53 Tripod Dolly folds in an instant with one hand yet sets and locks in position with a quarter turn of the lifting handle. Individual indexing pins permit you to caster, steer, crab or track straight. Snaplock adjustable tripod tiedowns accept all O'Connor tripods and any other makes.

For further information contact O'Connor Engineering, 100 Kalmus Drive, Costa Mesa, CA 92626 (213) 627-4057

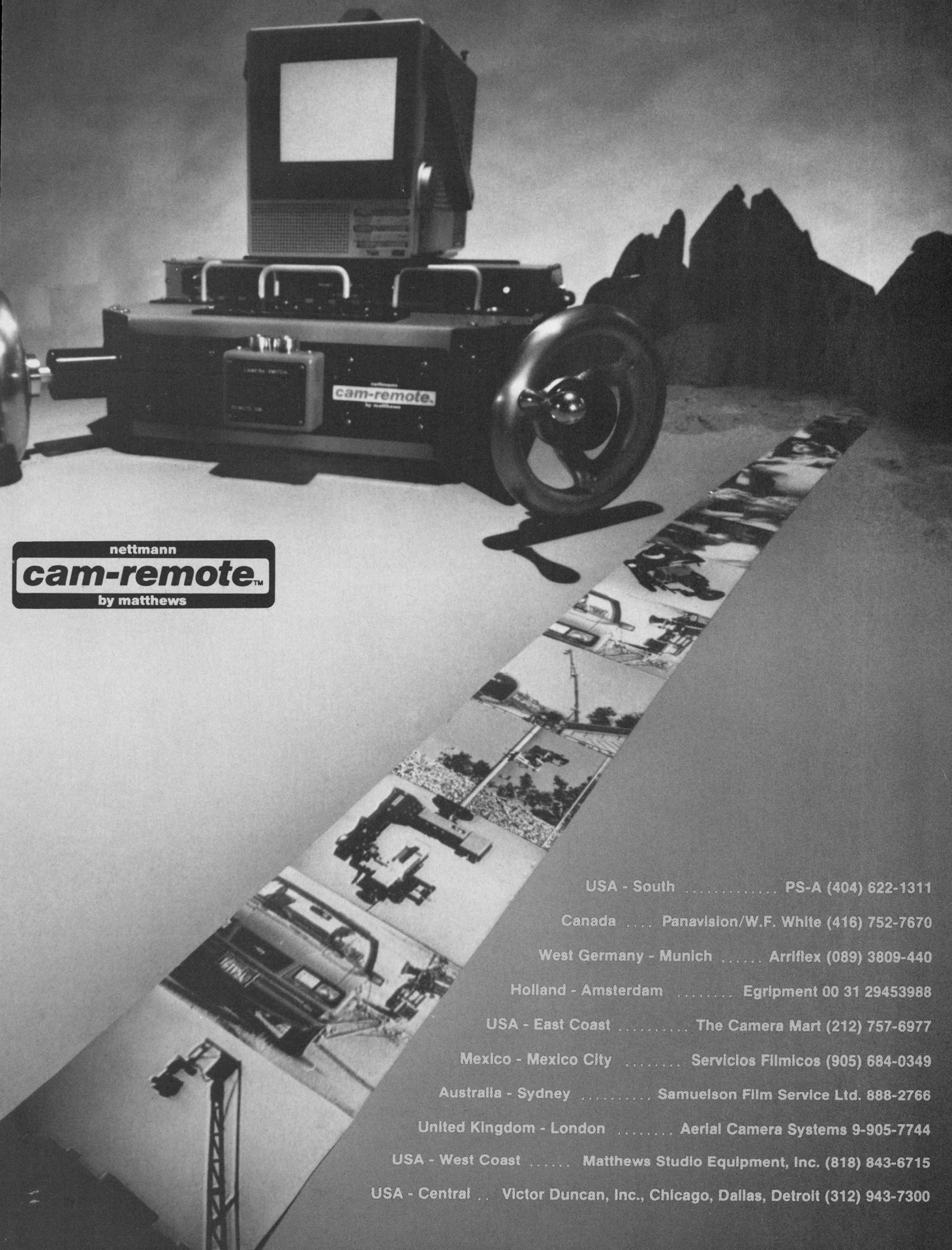


VTR Battery Analyzer

Alexander Manufacturing Co. has made a series of major improvements in the Tri-Analyzer battery analyzing device.

The new TA-3877-II utilizes a more efficient switching system result-
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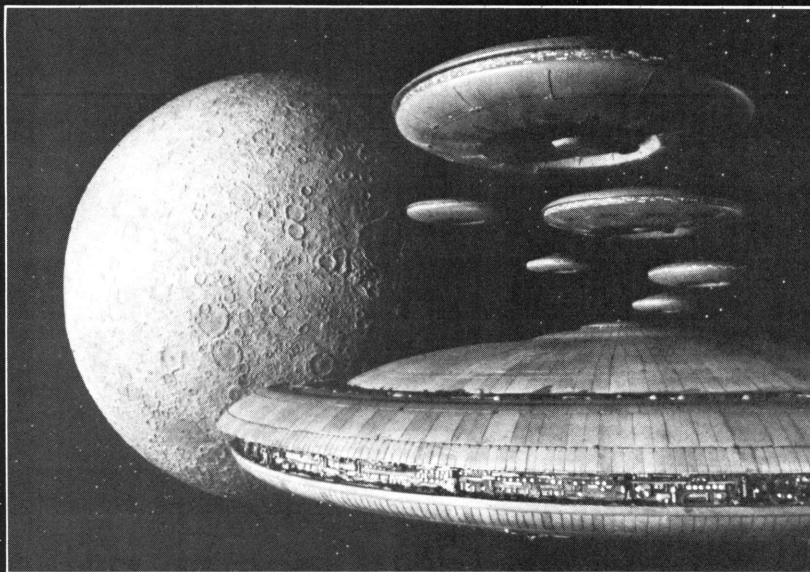
United Kingdom - London Aerial Camera Systems 9-905-7744

USA - West Coast Matthews Studio Equipment, Inc. (818) 843-6715

USA - Central ... Victor Duncan, Inc., Chicago, Dallas, Detroit (312) 943-7300

DAVID STIPES / RICHARD BENNETT

"V" (Series) © 1984 Warner Bros. Television



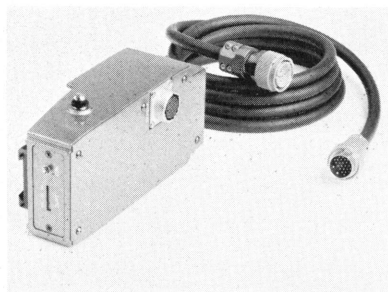
David Stipes Productions designs and produces titles and special photographic effects with miniatures, motion control, matte paintings and animation for the motion picture, television and commercial industries. Take a look at David's work, call **(818) 765-6390**.

Richard Bennett, of Cinema Engineering Company, designs, manufactures and modifies special photographic equipment for the motion picture, television and commercial industries. Need special equipment? Call **(818) 765-5340** and see if Richard can help.

ing in a dramatic savings in weight, with a reduction in heat. The micro-processor has been given a triple "spike" protection, and there is an automatic reset in the event a surge does get through.

The Tri-Analyzer determines the remaining capacity in a variety of rechargeable nickel-cadmium VTR batteries. The process, which also dememorizes and charges the cells, is completely automated and needs no monitoring. At the end of the analyzing process, remaining capacity in milli-amp hours (MAH) is displayed on the LED read-out.

For additional information, contact Alexander Manufacturing Co., Box 1645, Mason City, Iowa 50401.



Beta Recorder Adapter

Ikegami Electronics Inc. has introduced the VBA-1, a new Beta recorder adapter for use with the Ikegami HL-79E ENG/EFP camera. The VBA-1 enables the popular Beta format recorder to be used for the first time with an Ikegami camera.

The new unit consists of an adapter that attaches directly to the recorder and a special cable to the VTR connector on the camera. It will satisfy those production needs that require Beta recording and editing.

Ikegami is presently developing other adapters for use with the ITC-730A and ITC-730AP broadcast cameras. These models are expected to be available within the near future.

For further information, contact Ikegami Electronics, Inc., 37 Brook Ave., Maywood, NJ 07607. (201) 368-9171.

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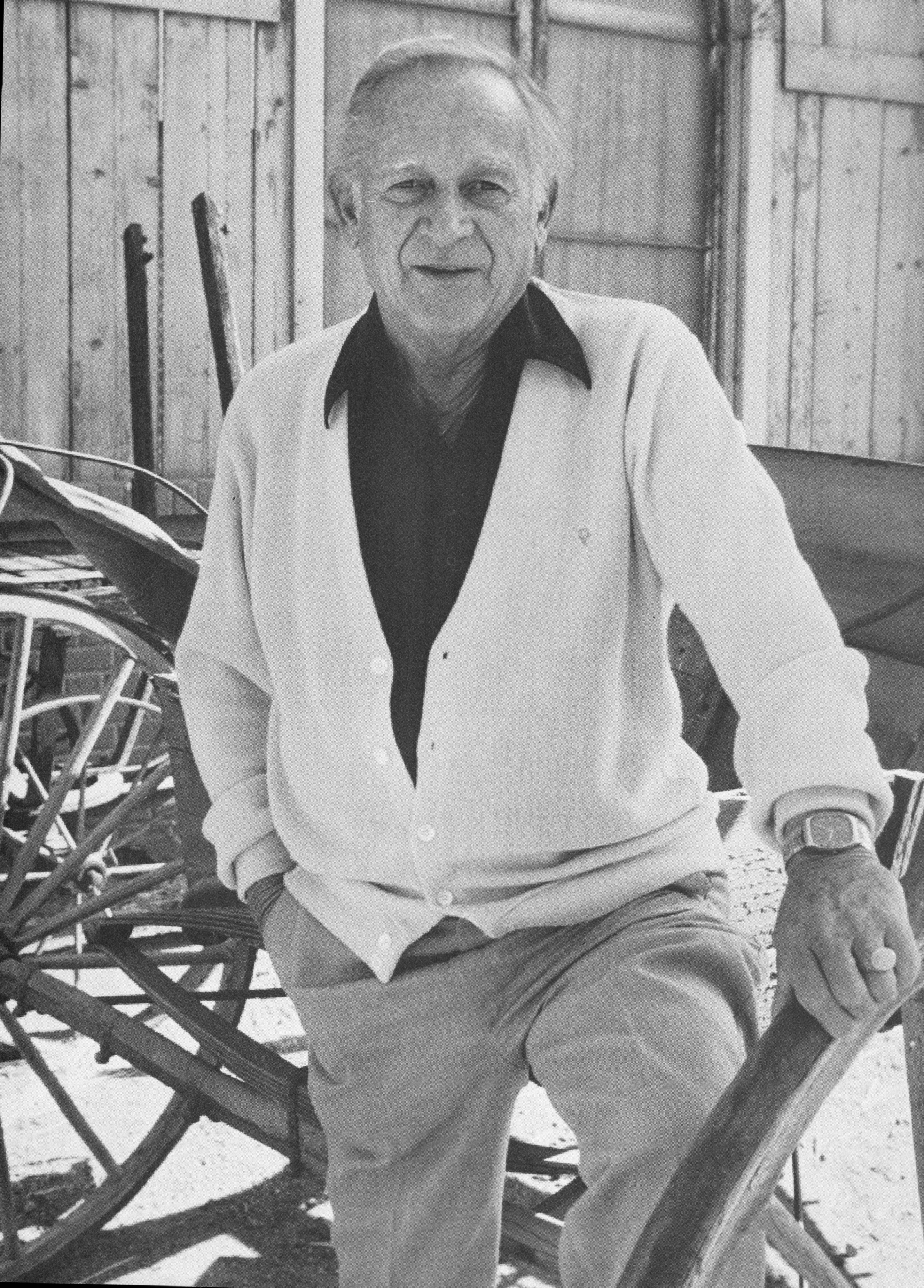
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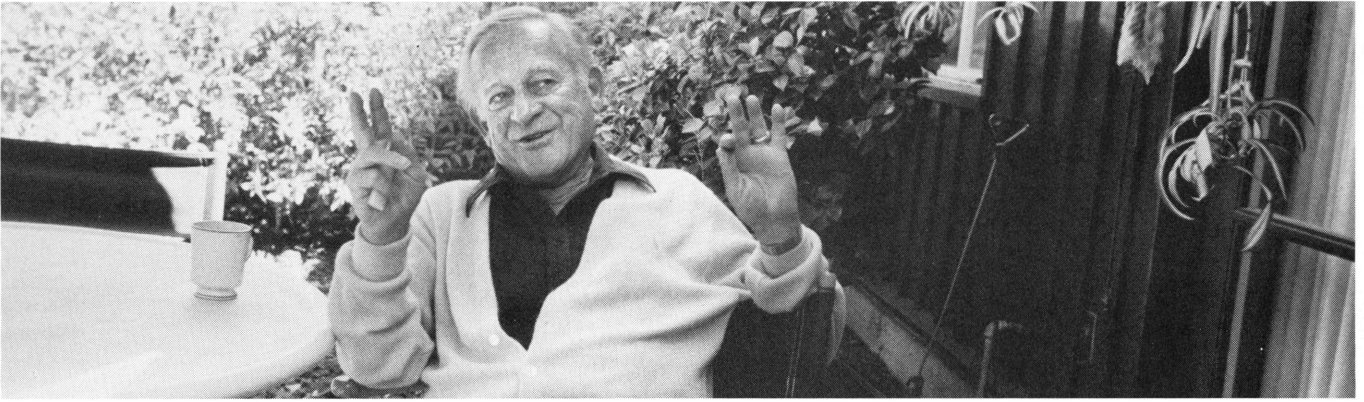
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VOIGTLÄNDER



"Cinematography is a form of orchestration."

Ted Voigtländer, A.S.C., is the most honored television cinematographer in the medium's history, and the only one to receive three Emmy awards (for It's Good to Be Alive, The Fighter, and The Craftsman). He received a total of 14 Emmy nominations.

"I believe in true light sources, incident light. I don't want to lie on film. I don't want to be a phony. If you go through art galleries and look at the Old Masters, they always followed the scheme of a true light source. That's what I build around. I also try to achieve balance and texture, so the viewers know just how far away they are from a wall or a subject. I light my shadows instead of letting them all go completely black. The world isn't completely light or dark. So I put some fill in my shadows. The big screen is not as fallible as the TV tube. Shooting for television, you have a lot to contend with when you try to highlight and reduce shadows. The look gets dirty, or 'noisy' as they say in video.

"I'm also a believer in motivated camera, in unobtrusive cinematography. I learned that eloquently from Randall McDougall, who was president of the Screen Writers' Guild. We worked together on an MGM feature called *The World, The Flesh, and The Devil*, in which Harry Belafonte was underground after the hydrogen bomb had been dropped. He's supposed to be the one person left on earth. And McDougall posed this question to me: 'If he's the only one in the world, who is photographing him?' You see my dilemma.

The audience must not be aware there's a camera operator. The picture takes place only in the eye of God. That's remained in my mind.

"Cinematography is a form of orchestration. Like the work I did on the remake of *The Diary of Anne Frank*. The cast faced one another in one room for five weeks, and the plot was such that daytime—your normal high-key type of thing—was when they had to be quiet. Night was when they could walk around. So I had to be subtle and fill things up, as you would with music. Only I did it with lighting so it wouldn't be the same static look. I produced valleys and mountains, hills and dales of light. To build you up and put you down and build you up again. Part of the suspense of that film was produced by lighting.

"Recently I did a feature directed by Michael Landon called *Sam's Son*. I shot the whole picture in Eastman color high-speed negative film 5294, and it worked very well because there are a lot of dramatic incidents in the picture. The 5294 contrasts let you be more dramatic and go into darker shadows. I never expose or light differently even if I know the original film negative is to be transferred to tape. I just go for a good negative. I believe in giving the laboratory a very rich negative, then they can print it any way they want. With 5294, you've got a printing range you cannot believe. I'm a great fan of 5294; I've probably shot four million feet of it.

"Compared to doing a feature, the shorter schedules for a segment for a weekly TV show have led me to develop a

kind of short-cut approach. Foremost is knowing my crew, knowing everybody's moves and having everybody know mine. We become a time and motion study together. I also thoroughly check out locations in advance to anticipate difficulties. And of course I get to know my director. A director and a cinematographer almost get married for a picture, they're so creatively involved with each other.

"The film look," as everyone calls it, has much more gradation than the video look. There's a richer look of film and a flatter look of tape. When I shoot on Eastman film, I know I can count on the results. It's the best consistent quality."

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**Eastman film:
Images from
Innovation.**



Underground Wonders for

THE GOONIESTM

By George Turner

Industrial Light & Magic, the special effects facility of Lucasfilm, Ltd., achieved high rank in its field through its superb work in Lucas productions. More recently it has branched out to do work for other production companies, also with great success. One recent film which contains some striking contributions from ILM is *Goonies*, a Warner Bros. release presented by Steven Spielberg and produced and directed by Richard Donner.

This action show maintains a fast pace while depicting the adventures of seven youngsters – a sort of Our Gang for the '80s – who are searching for treasure while fleeing a family of gangsters in the tunnels and caves beneath an ancient seacoast inn.

Two of the key men involved in the visual effects of *Goonies*, ILM general manager Warren Franklin and supervisor of special effects Mike McAlister, discussed the project with *American Cinematographer*.

"When a script comes in we try to keep an open mind about what things we might be able to do and really look at it from a lot of different perspectives," Franklin said. "It's an advantage that we have five different visual effect supervisors who offer a lot of different approaches. We try to get everybody together and say, 'Here is the film and what are the different things we can do on it?' and then we try to come up with something that satisfies the

budget requirements as well as what would work best for the particular film. Sometimes those aren't the same thing and we try to balance them out. We try to keep an open mind as to how simple or complicated it needs to be. We like to use bubble gum and coathangers if they'll work. Sometimes they need the latest technology and we're certainly trying to keep very active in that.

"In the case of *Goonies*, they had such a short post-production schedule that it became obvious up front that we needed to build as much practically as we could, because going the route with miniatures and so on would have taken a lot of time we didn't have. Therefore, the production

designer, J. Michael Riva, tried to build everything he could. The pirate cavern and ship were built at The Burbank Studios and then we augmented them with matte paintings and miniatures to make them seem even bigger than they were. Mike Riva did a great job.”

Franklin pointed out that the approach is almost opposite to what was done with *Indiana Jones*. “It’s just a question of deciding what’s right for a particular film instead of saying that just because we did it in *Indy* we should do all the underground stuff in miniature on *Goonies*. One must look carefully at the schedule and the budget and all other considerations. It may mean saying we’ll just do a few matte paintings on this show as opposed to making it a huge special effects movie. That kind of versatility pays off. We’re not giving anybody any more than what they need. We let the producer and director figure out what’s right for their film and then we help them out. George Lucas’ whole philosophy is to have a full service film company where people can come in and the number one priority is to make good movies.”

Mike McAlister, who had been director of photography for the special effects of *Starman*, graduated to supervisor of visual effects on *Goonies*.

“*Goonies*, as it turned out, was quite a small project compared to what we’re used to,” McAlister recalled. “Although I did have to have camera crews doing a lot of the shooting, I was actually able to do a lot of hands-on stuff. It’s real fun for me because it takes care of my creative urges – I get to express myself that way, and also get to use my hands working with technical solutions to problems. I started at USC as an engineering major and switched over to cinema after two years. I’ve used everything I learned in engineering here at one time or another.”

McAlister and his crew shot background plates at The Burbank Studios and on location in Oregon. “On the stages in L. A. we were sort of a third unit that



followed everybody else around and tried to match lighting in it all,” McAlister said. “We got our plates on the stages there and then came up here and, in some circumstances, tried to put a pirate ship into the place that we had photographed down there.

“They had built a pirate ship from the masts down and it was incredible! It was worth being on the movie just to see that set. The sails and the rigging were painted in, as was the top of the cavern and the upper half of the cavern walls. The matte department – Chris Evans, Frank Ordaz and Caroleen Green – painted all that stuff. I served as the liaison between the director and the matte department.”

Chris Evans said that the matte work was minimal in *Goonies*. “Just a few shots that needed a little paint in them, fill in the gaps, that’s all there was.”

McAlister described one sequence which utilized some unusual techniques. “A stick of dynamite goes off, some booby traps are released and the cave starts collapsing. We built a wall about 18 feet tall, made out of foam with urethane foam sprayed on the back. With very light glue and plaster we mounted rocks all over the face of this cliff, so that when we’d beat on the back side all the rocks would fall off. We shot it at

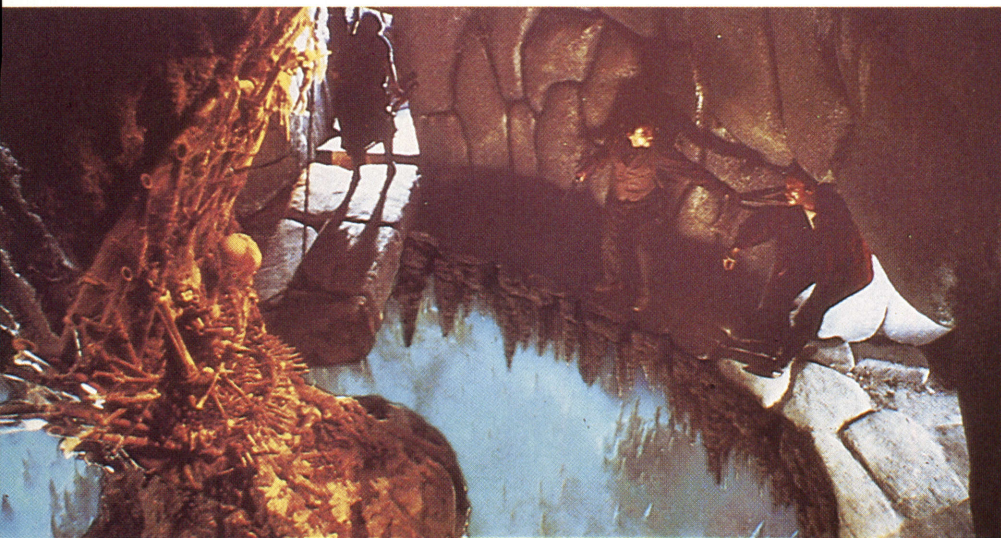


Modelmaker Bill George adjusts the rigging on miniature ship. Below: George and Chuck Wyley constructed detailed wooden model of the pirate ship. Opposite page—Composite of the pirate ship made from an animated transparency.

Photos by Kerry Nordquist/ILM

high speed and added some smoke and light flares and such.

“That was combined with the big set, which was another background we’d shot at Burbank. What we finally did was just remove the wall of their set – the cave wall – and replace it with our miniature. It was probably the most complicated shot in the movie for us. When the rocks splashed in the water, that was the real water in the big set. We had the practical effects people down there submerge air cannons right below the water, and when they’d shoot those off it would create a big splash. Everywhere there was a big splash we’d choreograph it in



The pit is a miniature and shot as a blue screen element. Later it was composited with the live action set.



advance. We would put a rock falling into it and halt printing on it or put an articulate matte edge on so it would appear to submerge into the water with a big splash.

"When you're shooting a set with the intention of replacing part of it, you can't have any foreground objects passing in front of the part you're going to take away, because then the foreground object would be taken away as well. If something splashes in front of the wall you're trying to get rid of, when you get rid of the wall you'll also get rid of the splash that covers the wall. Then you have a splash that starts nicely and suddenly it gets cut off! So, we weren't able to put as many splashes into

the plate when we photographed it as we knew we would end up wanting. Once we'd finished photographing it with all the actors, we set up in the water and turned off all the lights on the stage except two, to light an area of the water where we'd have these generic splashes go off. We shot them full frame, reduced them later and just placed them wherever we wanted to in the frame."

Bruce Walters, of ILM's animation department, described the painstaking method used to time the "falling" of the rocks.

"They tried to shoot the rocks on stages, but they were using foam rocks and when they fell they would practically float down," Walters related. "So Charlie Mullen, head of the animation department, went to the stream behind his house and selected a number of rocks averaging about two inches in length. He drilled holes in them. Then he rigged up a deal on the animation stand so that he could photograph the rocks. He put a motor into the hole in the side so he could rotate the rock and photograph it to get the move of it falling. He was shooting down and the rock moved from the top of the frame to the bottom as if it was falling. Then we rigged a blue screen on the animation stand and we shot all the rocks, one at a time, that way. We match-moved the fall so that when the splash they created

on the set happens the rock would be in the right place."

McAlister described several shots in which the pirate ship escapes from the cavern and people on shore watch it sail out into the sea.

"One of these shots that I thought turned out well was of the ship passing behind some rocks as it leaves the coast and heads out to sea. It is nice and hazy, but it was a terrible thing to accomplish. We tried over and over again to get it composited." The difficulty, he explained, was in getting the ship to "stay back there" beyond the rocks. "It's these subtle, hazy atmospheric conditions that really make our work difficult. When you take a hazy scene and try to matte something into it, whatever you're matting has to be hazy as well. It's very difficult matching the atmosphere of the two elements. John Ellis, who did the optical work, did an exceptional job on those shots."

Bruce Walters recalled that the departing ship was "just a transparency of a model. We overlaid the rocking motion of the sea into it with a special computer program. We got the program by match-moving actual footage of a ship on the water. We got the main bulk of the model from one place to another with the transparency. Then we just added in the rocking motion - the camera does the rest."

"The transparency was of the whole ship, so we took pieces of paper and ripped them along one edge and mounted them on opposite peg boards and moved them across the bottom of the ship. This created the waves lapping on the bottom of the ship, so when the mattes were done it had that element in it and all we had to do was to stick it in the frame and it gave the illusion that the ship was sitting in water."

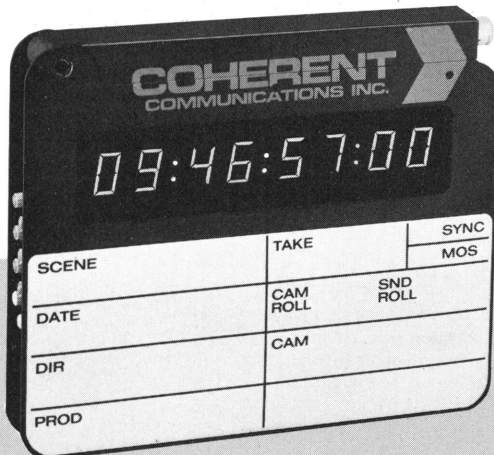
Another complex sequence occurs when the youths are being chased by the villains and they run into an organ chamber. The only way to escape across a chasm is to play an organ made

of bones. With each correct note the drawbridge comes down a bit, moving closer to bridging the gap. Each time they play a wrong note, a piece of the floor falls out from beneath them.

"We did some shots there of the floor falling away into oblivion, a big cavernous opening below with stalactites and obvious danger and death," McAlister said. "Again, we shot the foreground plates with the action in Burbank, and brought that film up here and designed the floor pieces that were supposed to fall away. We built them to match what they had in the practical set but in about one-third scale - the three-foot rocks were one foot across. We took those up to the top of our stage ceiling and dropped them into the reflective blue screen.

"We started out matting those in over matte paintings, so that when the floor pieces dropped away there was nothing there but the stage floor and we did a matte painting to extend the hole so that it looked like it was going down to infinity. It was quite a tough scene to accomplish, and we went round robin for quite a while trying to come up with a concept of what was supposed to be below the floor that could tell you instantly, in a 24-frame cut, that it was death down there. It had to work almost subliminally.

"We toyed around with that for probably six weeks before we came up with something that was permissible. Ultimately we used not a painting but a miniature. We got some fog and smoke effects down there to give it a little bit of life. It was built on a miniature floor that was about 16 x 10 feet, and that was supposed to be something that was maybe a half-mile wide. As a general rule, the larger you can build miniatures the better off you're going to be, because you have more of an opportunity to add detail. It's especially so if you're working with smoke or water, because you can't miniaturize water. There are certain kinds of smoke that can be worked pretty well in miniature,



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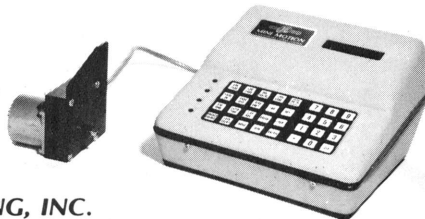
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but there's a certain point beyond
which they can't really be used."

The visual effects of
Goonies are a part of the stream of
fantasy effects for which ILM has
gained renown. The company also
is moving into a much neglected
area, that of creating visual effects
that enhance realism. Warren
Franklin expressed the idea shared
by the artists and craftsmen who
make it possible:

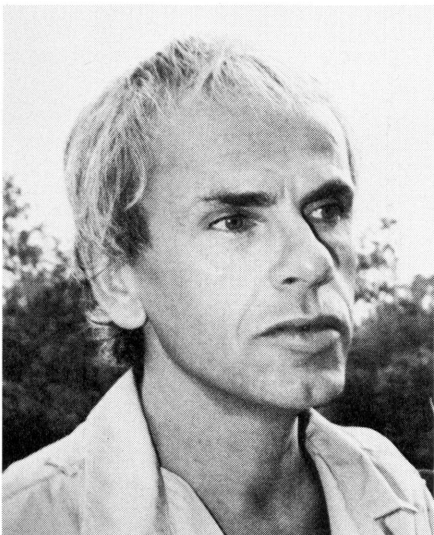
"Part of our job is to edu-
cate filmmakers as to what we're
able to contribute to their films,
and that it isn't necessarily a space
ship or an alien. It can be a mine
tunnel or an hallucination or just
adding a storm cloud and lighting
to make the scene look better.
People are beginning to under-
stand that we can do a lot more
than we have done and that we
can do things a lot cheaper in
many instances than they might be
able to do practically, and more
effectively as well. We have to
keep pushing the field forward, to
be working on more than just big
budget space movies or things that
are obviously special effects.
George Lucas is certainly inter-
ested in that. He looks at visual
effects as just another tool in his
filmmaking tool box. He'll use a
matte shot just as easily as some-
one else will use a dolly move, be-
cause he knows he can do it a lot
less expensively and get a lot more
production value from a painting
that's done right than by going out
and building a huge set or going
halfway around the world on
location.

"There are things a writer
will imagine that couldn't be done
any other way, places they want to
go that don't exist, things that are
out of this world or full of the
fantastic. And then there are
things that are much more vivid
when done with special ef-
fects - like the mine chase in *Indi-
ana Jones*," Franklin said. "We
look for stories and scripts that we
can contribute to that are different
and have things in them that peo-
ple wouldn't expect us to be
working on. That's where the fu-
ture is and we want to be there."

△

Director of Photography - Jan DeBont
Talks About LTM HMI Lights:

"In the most difficult situations LTM's HMI Lights hold up"



Jan DeBont is a respected Director of Photography. His film credits include; *JEWEL OF THE NILE*, *CLAN OF THE CAVE BEAR*, *FLESH & BLOOD*, *FOURTH MAN*, and *ALL THE RIGHT MOVES*.

"There really is a difference in HMI LIGHTS!"

The difference between LTM's HMI lights and others was recently demonstrated in New York. Color gels placed in front of other lights were continuously destroyed by heat. The heat that came from an LTM lens was much less. For a cameraman this is a big help. LTM's lights are ideal for shooting through very heavy filters. The Luxarc 12000 is the only light powerful enough to go through multicolor gels and diffusion material.

GREAT ON SERVICE

Service is extremely important. LTM has ample stock of their lights available in Los Angeles, New York, Florida, Paris and at La Victorine Studio in Nice. If spare parts are needed, they are always available.

During Shooting of *JEWEL OF THE NILE*, LTM International Production Services went out of their way to provide us with what we needed. When we required additional cyclorama lights in Nice, they called Paris and had them especially made for our use.

BELOW:

LTM International Production Services provided lights and grip equipment during shooting of *JEWEL OF THE NILE* in Morocco and at La Victorine Studios, Nice.

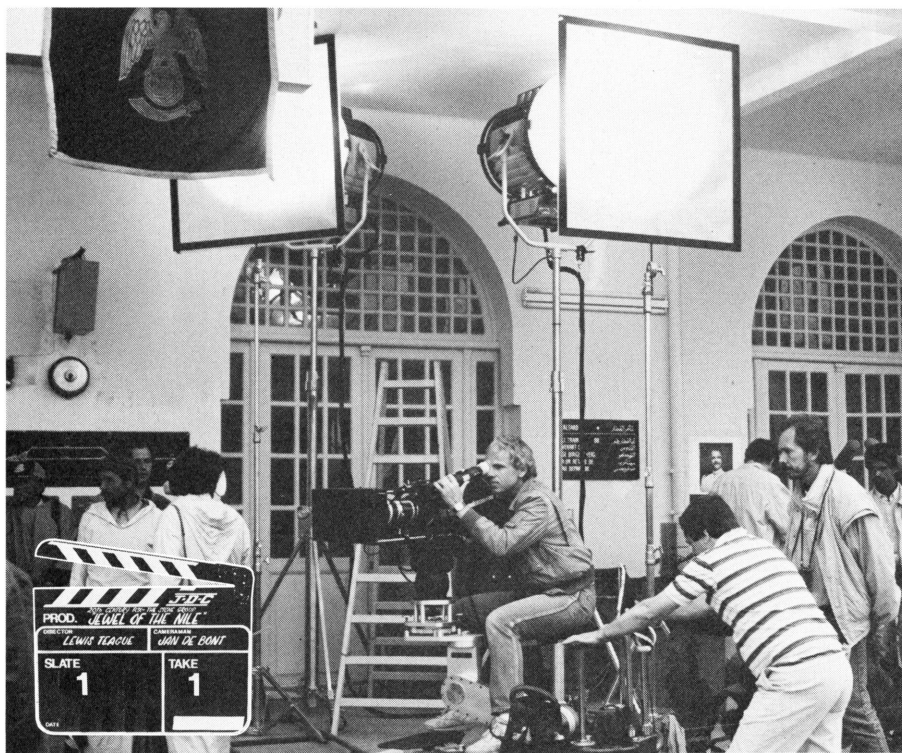
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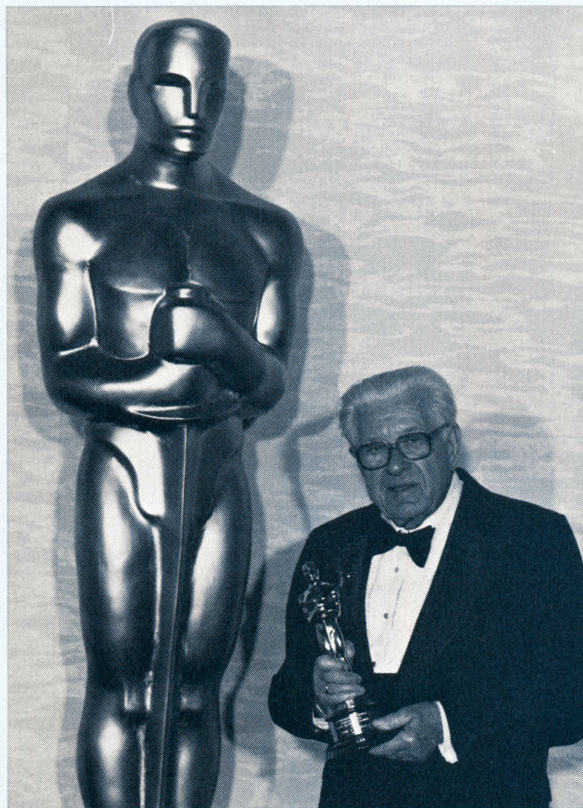


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Cinemasters

Lin Dunn receives the Gordon Sawyer Award, 1985.



Linwood G. Dunn ASC

by George Turner

Sixty years is a long time in any business. In the motion picture business it's almost a miracle.

For Linwood G. Dunn, ASC, movie miracles have been stock in trade for most of those six decades since he first shouldered a camera in the streets of New York City. He has long been recognized as one of the most innovative practitioners of the magical art of special visual effects.

He was born in Brooklyn on December 27, 1904, and raised in Flatbush. The family was in financial straits, so Lin and his younger brother, Lloyd, worked as musicians during their high school years. Neither had much formal training. For Lin it was three days of piano lessons, some informal coaching in violin from a neighbor, and, later, three days of saxophone lessons from a good professional, George Eberle.

"I used to play in a band four nights a week, maybe," Dunn recalls. "I carried the sax and violin cases clear across town on the subway and elevated. It would take half the night to get there and half the night to get back, for \$5. Because I could play a little on the violin I got an extra dollar."

By 1925, he and his brother and sister were playing in a summer resort band in the Catskills. (Lloyd Dunn, incidentally, retired several years ago as vice president of Capitol Records.) Lin also was developing an interest in motion picture photography.

Dunn was "movie struck" at an early age. He still has pages of notes and comments he made on pictures he saw as a youth. His first work in the film industry came in 1923, when he became a projectionist for the American Motion Picture Corp., a non-theatrical film distributor in New York City. He carried a portable 35mm projector to schools and churches.

"That was at the time acetate film was coming in," Dunn remembers. "Very poor film, but they had to get the nitrate out – it was too dangerous. I was in a couple of nitrate fires and it's an awful experience. I went to one church and something happened in the machine, the film stopped and it was nitrate. It went up and – it was an involuntary thing – I picked that suitcase machine up and threw it right out a window that was next to me, through the glass."

His uncle, Spencer Gordon Bennet, was the stuntman for Pearl White, star of Pathé serials. "He'd come over to the house all beat up. One time he went through a burning ship and he was all bandaged with nothing but holes for his eyes and nose." Bennet later became Pathé's top serial director, his first solo effort, in 1925, being one of the most popular of the lot, *The Green Archer* starring Walter Miller and Allene Ray. Dunn, who was pursuing a musical career, was told by his uncle that he was putting together a crew for *Archer* and that there might be a chance for an assistant cameraman job. Dunn remembers: "He said to me, 'When the time comes, I'll let you know and see what I can do.' So I'm up in the Catskills and I get this wire, 'The job is open and you must be here by two o'clock tomorrow, and if you're not here there'll be two other people ready to take the job.' I dropped everything and rushed down and two guys were sitting there waiting. I got the job."

Being an assistant meant looking after two movie cameras, a still camera, and equip-

ment, keeping everything scrupulously clean, loading film and doing a miscellany of chores. On *The Green Archer* it also meant playing the title character – a mystery man in mask and Robin Hood costume – on occasion. In serial production it was customary to have mystery characters played by any member of the company who happened to be at hand. The differing sizes and shapes caused no worry; they only made it more difficult for the customers to guess the identities of such characters as the Clutching Hand, the Iron Claw, the Fox or the Frog.

“The director and the cameraman would decide where to set up a scene, then tell the assistant to bring the equipment,” Dunn says. “On my very first picture, they walked out on a breakwater while I waited. Then they signalled to me and I put the camera and tripod across my shoulder and started walking across those wet rocks. I had magazine cases in the other hand. Nobody told me how to put the tripod across my shoulder properly and it had no pad on it. It started cutting into my flesh and the blood started down my shirt. But I wouldn’t set the thing down and I went on out there. When I arrived, my shirt was all bloodied. So finally somebody showed me that if you set it a certain way it was easy to carry.

“I learned a lot from Spence, not because he was my uncle but because he was a hell of a director. He was hard on me just because I was his nephew. He was *terribly* impartial to me. He’d go up the hill with the first cameraman, Eddie Snyder, and look at the shot and say, ‘Okay, come up.’ I’d carry the cameras up and he’d say to me, seriously, ‘What the hell kept you?’ The crew felt bad for me; they’d say, ‘Spence, you treat him like a dog.’ He didn’t want them to think there was any favoritism, but he went overboard with it. He would get things over in the way he shot them better than any director I ever worked with. He could do stunts and fights, and if he had stunt people he’d show them how to do it. If somebody in the cast fell off a horse and broke an arm or a leg, everybody would think, ‘Oh, Jesus, we’ve got so many scenes . . .’ Spence would go to a corner with the script and we’d see him rewriting it right there. He’d say, ‘Give them 20 minutes,’ and he’d come back and have the guy written out of it.”

Dunn recalls in particular an auto crash scene for Pathé. “Two autos have to crash together. Well, he establishes it. One’s coming down the hill, cut to the other one coming, and keep cutting so they’re closer and closer and going like hell. Finally he cuts to one, pans down and stops at the curb where there’s a guy standing. The guy reacts to the crash, then the camera pans over to the set automobile, turned over with the wheels turning and the smoke coming out. That was *real*, and you never saw a thing!”

The next serial, *Snowed In*, was scheduled to be filmed in California because it required both summer and winter scenes. Dunn was assured he could have the assistant cameraman berth

if he would be in California to apply for it. “I had no money at all and I had to dig up \$150 for the railway fare,” Dunn remembers. “The bookkeeper on the Pathé unit said, ‘I’ll advance it and take it out of your salary.’ When we got there, early in January 1926, we found there was no snow in the mountains, so we had to go to Sun Valley, Idaho, to get the snow. We had a good crew: first camera was Eddie Snyder and second camera was Frank Redman. I assisted both.” The serial unit remained in California following completion of *Snowed In*, in the late summer of 1926. Dunn was assistant cameraman on three more serials before graduating to second cameraman on *Hawk of the Hills* in 1927.



A young jazz musician in New York

On the set of The Green Archer, 1925, at Pyramid Studio, New York Director Spencer Bennet gestures on the stairs, villain Burr MacIntosh stands in the doorway, henchman Frank Lackteen wears the sinister butler suit, and Frank Redman and Edward Snyder man the cameras. Assistant cameraman Dunn stands behind Snyder at right.





Handcranking a silent camera for Pathé.

Snowed In was made at the Fine Arts Studio, where D.W. Griffith had produced *Intolerance* and *Broken Blossoms*, at the intersection of Sunset and Hollywood Boulevards. The other Pathé serials were filmed at Metropolitan Studio at Las Palmas near Santa Monica Boulevard, which today is Hollywood Center Studio and was, at various times, General Service and Zoetrope.

It was the duty of the second cameraman to make the foreign negative, a duplicate of the first cameraman's negative. The second negative was shipped overseas, where prints were made and foreign dialogue titles were added. "That was handcranking, of course," Dunn emphasizes. "Two turns a second for a normal speed of 16 fps."

There were problems peculiar to the second cameraman's work. For example:

"Here is Eddie Snyder watching a rehearsal and then he says, 'I think this is where I'll set,' and he moves the camera. Then he looks at me and says, 'I'm set here, Lin.' Now they're ready to shoot so I have to come in quick. All the time I'm looking at both sides of his camera, because one angle's a little better than the other. He has the *best* angle, no question. So, I've chosen my side. If I'm on his right and crowding him to get the same angle he does, then he racks his Bell & Howell over and says, 'Dammit, Lin, I can't crank the camera, I'll skin my knuckles.' So I move over a couple of inches. Then if I get on the other side I have his damned finder to contend with and I have to have room to crank. Sometimes I get a little higher or lower. Sometimes, to center the people, I shoot off the set. So I get on the other side and maybe I can't center the people or will shoot off the other side of the set. So I move in a little closer.

"The Bell & Howell had a little bore-sight type finder with a ground glass about the size of a frame. Now I had a little image and an upside-down picture, which means I had to learn which way to pan an upside-down picture. Then Mitchell came out with a big finder, but it was upside-down. I knew through the grapevine that Mitchell was coming out with a rightside-up finder, and I didn't want to train myself to work with everything going backward; I knew that if I did that it would be difficult to untrain myself. So I got a ladies' purse mirror and put some clamps on the finder so I could look down at the mirror and have a rightside-up image. So I always was standing on a box, looking down."

The right-side up finder was of *some* help when it came to filming the hectic action that typified serial production. Dunn describes a representative situation at Pathé:

"We'd get into a shot with two guys arguing at a bar and the director would warn us, 'Somewhere in this scene there's going to be a fight and I want you to change speeds right in the middle of it.' So when the time came he'd say, 'Drop it down to 12 from 16 fps.' Now I'm panning and tilting and cranking the camera, so I slow it down and I grab the shutter and I pull that back from 170° to 120° for the exposure changes – all at once. Then the director says, 'Take it back to 16 again.'

"Then motors came out and we didn't trust them. We were out on location and we had batteries, but it was a while before we came to trust the batteries so we hand-cranked, but then we'd get shots where there was too much panning and tilting, like following a horse with a telephoto lens, so we used the motors."

Another of Dunn's duties was to make the overlap scenes from the end of one chapter to the beginning of the next. Each episode ended in a "cliffhanger" – the heroine or hero or both in a life-threatening situation. The subsequent chapter began with a repeat of the scene coupled with new footage showing the take-out (or rescue). Lavender prints were made of the scenes, which were given to Dunn. "I was always sure of another day's work. I'd put the master lavender in a bipack magazine, then put the raw stock in and point it up at the sky – a good bald sky – and guess the exposure and hand-crank that dupe through. Hand-cranked, bipacked, no meters (just figuring if it's a pretty bright sky it should be f5.6) and setting the lens out of focus so we didn't focus any clouds. (And years later I became an expert in duplicating films!) It meant an extra \$10 or so."

An extra \$10 was well worth the effort at the time. As an assistant, Dunn earned \$35 per week. He received a \$15 raise when he became a second cameraman. He worked a six day week and working days were 16 hours long. He sent most of what he earned to his parents.

"On one of those serials I had a set-up in a canoe in a lake at Jacumba, on the Mex-



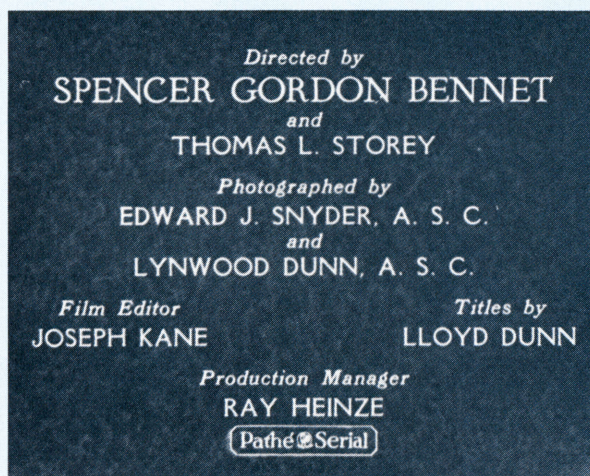
A composite made at Newhall, California, while Hawk of the Hills was being made. Director Bennet, cameraman Snyder and second cameraman Dunn are shown at left. (Photo by Oliver Sigredson.)

A Pathé Serial title card with Dunn's first credit line (including a variant spelling of his name).

ican border," he remembers. "I had a baby tripod and a Bell & Howell. When I set the camera up, that canoe went over 180°, with the camera and me straight down in the water! I got that thing out of the water and took the magazine off. I worried all night, but next day we learned that the water hadn't gotten past the magazine traps and the film was all right. I sat up all night under candlelight taking that camera movement apart and soaking the parts in oil so I could shoot next day.

"One day they said they were going to have to hire an aerial cameraman for two shots of a guy jumping out in a parachute from another plane. I said, 'Don't do that, I'll make the shots.' I'd never been in a plane before. We strapped the camera on the wing of the Travelair biplane and pointed it in the right direction, and I got in the front cockpit. I was scared to death until we got into the air, then I was perfectly relaxed and we got the first shot. The pilot had done that work before, and but for him I'd never have gotten the shot. Then there was the second shot, which had to be done using a telephoto lens, so I had to rotate the lens turret. I stepped out onto the wing, keeping one foot in the cockpit, and held onto the wire struts while I pulled the pin and turned the turret. With the blast of wind I thought the wire was going to cut my fingers off, but we got the shot.

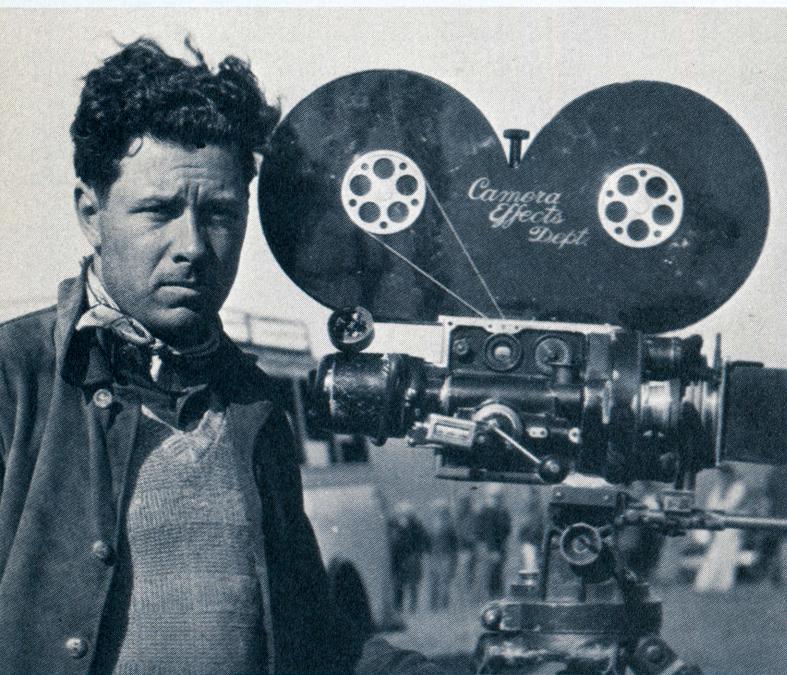
In 1929, Dunn started work on his 14th Pathé serial, *Queen of the Northwoods*, as first cameraman (the classification later was changed to director of photography). Shortly after the tenth and final chapter was completed, Pathé went into receivership, one of the first major film companies to suc-



cumb to the Great Depression.

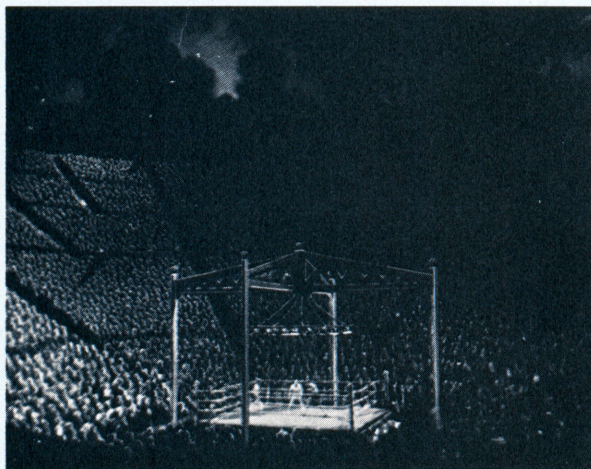
"I got some day work as an extra cameraman here and there, and even worked with Joseph Walker on *Flight*, Frank Capra's first talking picture at Columbia. Then, when the union was formed, I took my card as an operative cameraman, because I didn't stand a chance as a director of photography - I hadn't done enough of it.

"I was between pictures and my brother and I lived in a little furnished room, starving half the time because whatever we made we sent home. My father was an invalid and my mother and sister were there. We were playing in a basement nightclub down at 4th and Hill Streets, about six stories down into the ground. It was a dive, but we



On location at Bakersfield for *Cimarron*, 1930.

Dunn's first matte shot at RKO, for *Ringside* (1929).



played in a six-piece band. We'd go there at 7 p.m. and they'd let us go home when the last drunk left."

One Fall morning at about four o'clock the exhausted musician-cameraman fell into bed. Three hours later he was jarred out of bed by a phone call from Howard Hurd, business representative of the newly formed cameramen's union: "Will you go over to RKO at eight? There's a new department, a photographic effects department, and they need an assistant for a day or two." RKO-Radio Pictures, Inc., was a brand new company, the first studio dedicated entirely to the making of talking pictures. Radio Corporation of America, the Keith and Orpheum theater circuits, FBO Productions and other interests founded the company in 1928. It incorporated the production facilities of Pathé at Culver City (Laird International Studio today) and FBO Studio in Hollywood (today the west part of Paramount).

"I said, 'Can you get somebody else? I got to bed about four,'" Dunn recalls. "Later

he called again and said, 'I can't get anybody to go over there at eight o'clock so we'll get someone tomorrow.' I said, 'Well, I'm awake, I'll go.' I went over there and Bill Eglinton, head of the camera department, hired me. 'I want you to know that this is not a steady job,' he said. And I was there for 28 years. I lucked out because the department was forming. There were only two people there when I went over. A cameraman, Lloyd Knechtel, got the job to start the department. He was the brother of a famous special effects man, Alvin Knechtel, who was killed in an airplane accident. The other man was a wonderful artist who did matte and glass paintings, Paul Detlefsen, who's still alive.

"I went in as an assistant cameraman. They didn't have one in the department, but when they had a shot to make they'd get one. Mr. Eglinton asked me if I could stay on for a few days. I told him the only thing wrong was that I was an operator rather than an assistant, and he said, 'I'll pay you as an operator.' Later, an assistant joined the department and I stayed on as an operator.

"I learned by doing," Dunn explains. "I knew really very little. I'd done a lot of trick work in the camera in the silent days – composites, mattes, split screens, things we all did. The first optical printer I saw there was nothing but a lathe bed with a Mitchell camera stuck on it, facing a projector. We used the same camera to shoot inserts – you can't believe how crude it was. There was the projector, with nothing but a movement to pull the film through, and the camera pedestal facing it and a drive shaft running from the motor to run it.

"So we'd have to take the camera off the printer to shoot inserts and then slap it back on. Little by little, I decided this was an awful way to align the two heads. Then I got lines scribed so they could be lined up and got it optically centered. We even had no system for developing hand tests. We'd put the developer in the bottle and Knechtel used to say to go in the dark room with a bottle, stick the test in it, shake the bottle. I used to ask 'How many shakes?' He'd say, 'I don't know, just shake it a while.' I'd shake it and pull the film out and if it looked black, I knew there was a picture on it. Then I began to say, 'There's got to be a better way than this.' Little by little I worked up some systems – learned by doing, which is the hard way, but you certainly learn."

Dunn described his first matte shot for RKO:

"*Ringside* was the picture and Detlefsen was the artist. It was a night shot with the audience outdoors. We painted a lot of people in. They had a few real people scattered around so there'd be some motion and sometimes they'd put a few dummies in there, too. We'd paint the rest of the people in and we had a few little light effects to make them look like they were moving. At that time a matte painting was a double exposure."



Photographing a miniature Russian train for The Case of Sergeant Grischa at RKO, 1930.

The finished product – a convincing night effect shot.

Dunn worked with RKO's leading model maker, Don Jahraus, photographing miniature action for pictures like *The Case of Sergeant Grischa*, *Danger Lights* (an early widefilm production in the Natural Vision process), and others. He made his own zoom lens for a scene in a Technicolor film with Wheeler and Woolsey; it did the job perfectly despite the dire predictions of the Technicolor consultants. He photographed some of the earliest back projection shots. But his greatest interest was optical effects, and his distinctive optical work is in evidence in the majority of the 1,000 plus features and hundreds of short subjects produced by RKO between 1929 and 1958. A book – a large one – would be required to describe them in any detail. Herewith, we present a few highlights:

Radio Pictures introduction. That classic scene of the top of the world with a beeping radio tower which appeared at the first of the studio's product, was a large miniature with glass-painted clouds (Detlefsen) and photography by Dunn.

So This is Harris, Melody Cruise, Hips, Hips Hooray and Flying Down to Rio. For these high-style musicals of 1933, Dunn created an astonishing variety of theme-related optical wipes that inspired many imitations.

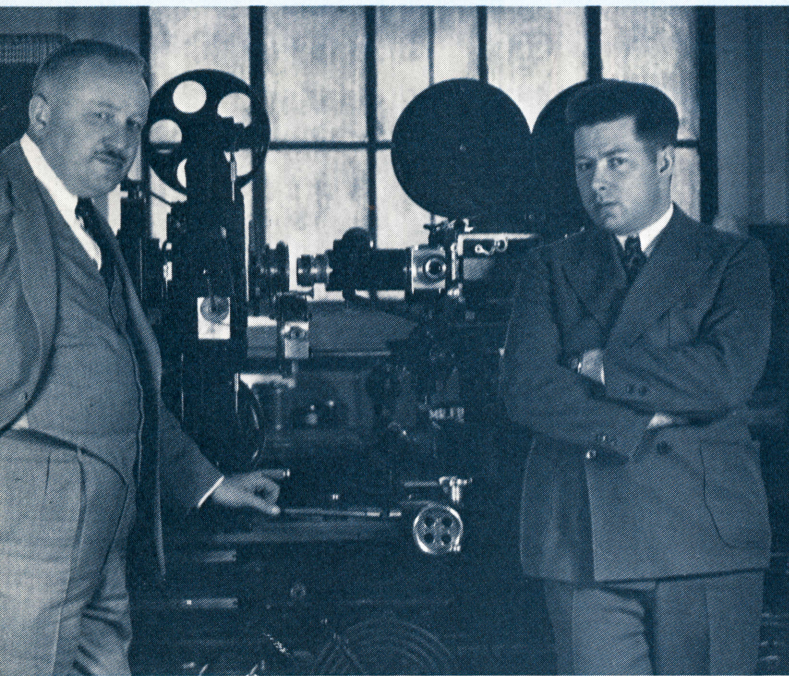
King Kong and The Son of Kong (both 1933). Willis O'Brien was in charge of the special processes used in these epics produced by the world adventurers, Merian C. Cooper and Ernest B. Schoedsack. O'Brien was making the numerous composites – in which stop-frame miniature prehistoric monsters were shown in the same frames with the



actors – in the camera. Dunn notes, "There were certain shots where it was advantageous to composite at the same time they animated, but generally I could take that animation and combine it with the background under controlled conditions to give him a perfect balance and contrast. I did a lot of work correcting contrasts that were off."

Lucky Devils, Phantom of Crestwood, Before Dawn, King Kong. All of these 1932-33 productions featured one or more scenes in which actors (not dummies) were shown falling away from the camera. Cooper wanted it done and Dunn provided the result on the printer. The vertigo-producing effect has been done often since then.

Flicker Flashbacks (1940s). A series of short subjects compiled by Richard Fleischer were made by RKO utilizing movies produced before 1912 which were deposited with the Copyright Office as



Vernon Walker, head of photo effects department at RKO, and Dunn, head of optical printing department, 1945.

Early television experiments at Don Lee headquarters in the early 1940s, with Dunn and Clifford Stine, ASC, behind the primitive camera. Note the Mitchell viewfinder attached to the box.



paper prints. Dunn produced new 35mm negatives from these and at the same time removed the unsteadiness caused by primitive cameras, uneven sprocket holes, etc., and improved the images considerably.

The Hunchback of Notre Dame (1939). Among the photographic effects in this superb picture is the closing scene, in which the camera pulls back from a close shot of Charles Laughton and a gargoyle on top of the cathedral, keeps pulling back until the entire cathedral and finally much of old Paris fills the screen. Dunn and Vernon Walker's expert staff repeated the technique in other films and in some instances reversed the movement (as in *Nocturne*, where the move is from a full view of Manhattan at night to a closeup of Edward Ashley playing the piano in his penthouse).

Citizen Kane (1940). Much of the celebrated deep-focus photography in Orson Welles' masterwork was optically composited. Other impor-

tant scenes done optically were the political rally, the scene backstage in the opera house in which the camera moves up from the singer to the stagehands standing in the highest rafters, the camera panning down a statue into a scene originally filmed without the statue, and the final scene opening with the warehouse and moving in to the burning sled. Dunn estimates that a great amount of the picture went through his optical printer and says that Welles "used the printer like a paint brush."

Bringing Up Baby (1938). Cary Grant, Katherine Hepburn and Charlie Ruggles had to appear in many scenes with a supposedly tame leopard. The leopard wasn't all that docile, so the actors and the beast were filmed separately, then composited flawlessly.

Mighty Joe Young (1949). Another Cooper-Schoedsack-O'Brien giant gorilla show, which won RKO an Oscar for special effects. The opticals are much more sophisticated than those of the *Kong* films.

Dunn and his printer saved a great deal of money for the studio by rescuing scenes that, for various reasons, were unusable. Often, for example, it was necessary to remove or render illegible names painted on buildings, trucks or billboards. Here are a few examples:

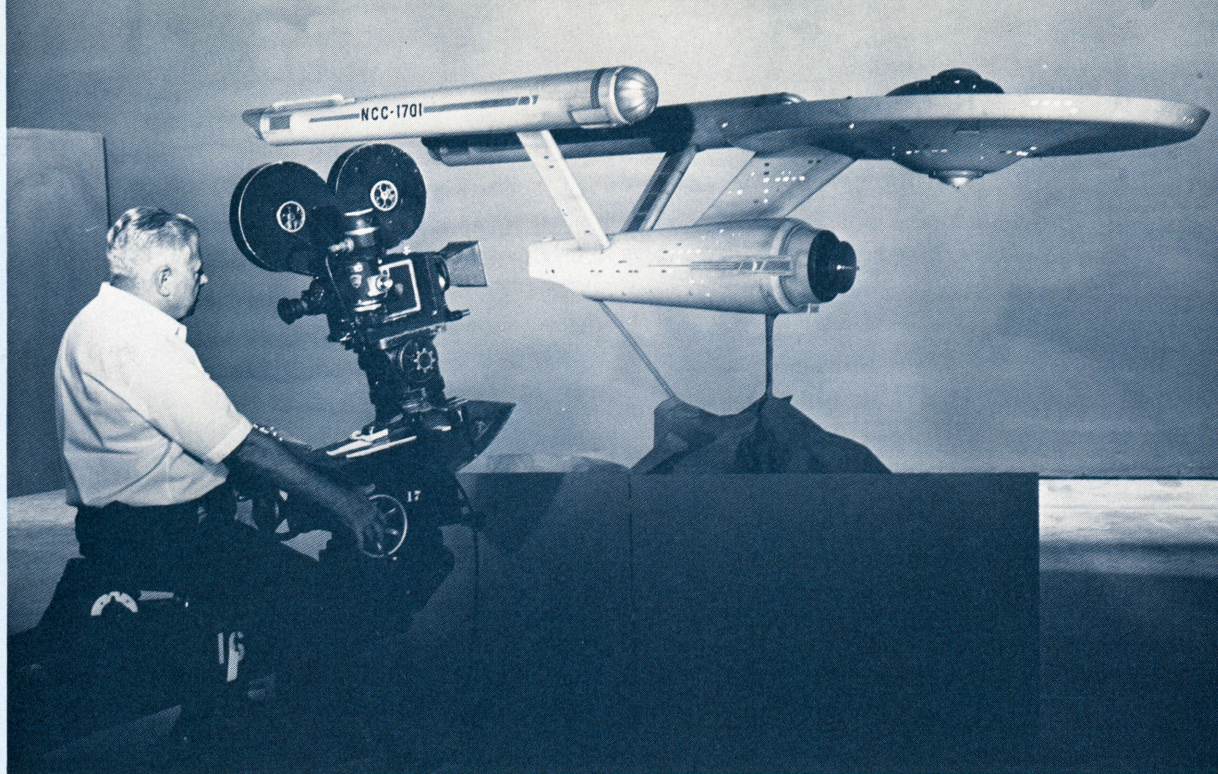
Ace of Aces (1933). An instant after Richard Dix crawled out of his crashed airplane it was supposed to burst into flames. The explosion failed to occur until after he had moved out of the frame. Dunn created a split screen around Dix and moved the explosion ahead some 20 feet, so that the flames arrived on schedule.

Down to their Last Yacht (1934). The stringent censor board decided that the chests of some of the ship's crew were too hairy, so Dunn "had to do a little retouching - in motion."

Anne of Green Gables (1934). "They had Anne Shirley back for retakes after the picture was finished and her pregnancy showed up in some of the shots, so I sort of shaved her down a little."

The French Line (1954). Some of Howard Hughes' shots of Jane Russell roused the ire of the censors. "The film editor, Eda Warren, would say, 'I've got a couple more bazoom shots for you,' and that meant I had to put diffusion or shadows over her or move in and crop and do all sorts of doctoring to make the scene acceptable to the Hays Office."

The Narrow Margin (1953). The acclaimed climax is a fight to the death in the narrow aisle of a train. "They edited it and it didn't have enough zip to it. I put it on a Moviola and X'd out certain frames, like if a guy threw a punch and it was three frames, I'd take out one of them, or if one of them was knocked to the floor I might take out one frame just as he hit the floor; he'd hit harder then. Same day, on the printer, I took those frames out and next day I showed it to them and it was all the difference in the world."



Photographing the 12-foot Enterprise space ship model for the Star Trek TV series. The blue background screen was part of the process of printing in the starfields.

The Cat People (1942). "They didn't make any proper plans to turn Simone Simon into a cat. I took her close-up and dissolved it into a duplicate that was very high contrast where the face started to wash out, and then increased the contrast so she changed into a horrible, dark thing."

The Thing (1951). When the alien was electrocuted at the end, it was intended that the sparks would be put in on the set using coils. When this failed, Dunn electrocuted the creature on the optical printer very effectively.

In 1942, Eastman Kodak Co. approached Dunn about the need by the U. S. Armed Forces Photographic Units for special effects optical printers. "In all of the major studios and in the few independent optical effects companies, such printers were always hand-made 'Rube Goldbergs' such as the equipment I developed and operated over my early years at RKO," Dunn explains. "They never had been manufactured as a commercial 'shelf item' product.

"I was then commissioned by the government and Kodak to design and have manufactured a standardized machine that could be readily obtained as required for all the optical printing needs of these motion picture units in worldwide locations. My RKO assistant over the many years, Cecil Love, and I, worked out the design of the printer." In selecting a quality manufacturer, Dunn found in Edward Furer's Acme Tool and Manufacturing Co. in Burbank "the interest, enthusiasm, talent and financial responsibility" that was needed.

"It happened that Cecil Love had recently joined the U.S. Navy Photo Science Laboratory in Anacostia which, coincidentally, was to be the first installation of this new printer," Dunn recalls. "This was surely a good break, because Cecil could

keep me informed about any changes needed for future optical printers based on his daily experiences with this prototype. Thus we could anticipate that our design might well become the industry standard."

And so it did, after the war ended and the Acme-Dunn Special Effects Optical Printer was made available. "It served as a nucleus for new independent special effects organizations, many formed due to the gradual elimination of the major studio departments," Dunn says. In 1944 Dunn and Love were given an Academy Technical Achievement Award for "the design and construction of the Acme-Dunn Optical Printer." In 1981 the Academy upgraded the award to an "Oscar" for basic achievements which have a definite influence upon the advancement of the industry."

Dunn continued his work for RKO, becoming head of the Photographic Effects Department later. He weathered the eras of 3-D production, the anamorphic craze, and changes of ownership, including the eccentric reign of Howard Hughes. RKO ceased film production in February, 1957, and departmental operations eventually were shut down. Dunn arranged with Ray Clune, studio manager, to lease the special effects facilities, merging the operation with a company he had formed in 1946, Film Effects of Hollywood.

There were two lean years for the company, which originally had been set up to develop optical effects for 16mm film. Dunn's experiments there led to the first complete 35mm feature to be blown up from a 16mm Kodachrome original to an internegative, to assisting Cecil Love in his unique design of the first triple head printer to produce and/or combine registration of three-color separations simultaneously, and the designing of the first Cinedupe



At Film Effects of Hollywood with one of the miniature buildings of *It's a Mad, Mad, Mad, Mad World* (1963). The men on the ladder are five inches tall. This building is now on exhibit at the Hollywood Museum.

printer, to duplicate motion picture work prints on Ozalid film in one to two minutes.

In 1960, after five months of research and development on 70mm color optical effects for The Mirisch Company, Dunn was assigned to create and supervise the photographic effects for *West Side Story*, including Saul Bass' celebrated title sequence and the opening overture. The following year, Film Effects of Hollywood designed and constructed special optical and continuous printing equipment while completing special photographic effects for the unique Cinerama-Boeing 70mm Spacearium film, *Journey to the Stars*.

Dunn went to Madrid twice as special photographic effects consultant for the Samuel Bronston Company, in 1962 on *55 Days in Peking* and later for Frank Capra's 70mm Ultra-Panavision production, *Circus*. Some unusually complex miniature and optical work was done at Film Effects in 1962-63 for the 70mm widefilm production, *It's a Mad, Mad, Mad, Mad World*, which featured most of the leading comedians in the free world. One scene involving miniature and live elements required 21 separate exposures through the printer-camera to composite seven elements of the scene. This was followed by visual effects for the 70mm production, *Bounty Without Boundaries*, which was featured at the U.S. Department of Agriculture exhibition in Amsterdam.

The ability and capability of Film Effects to work with widefilm formats, including giant screen processes such as Imax and Omnimax, became well known throughout the world. Much of this expertise went into a wide variety of innovative non-theatrical productions for pavilions at world fairs, learning centers, museums and special exhibitions. A *Place to Stand*, produced in 70mm for the Expo '67 Ontario Pavilion, which utilized a sophisti-

cated multiple-panel optical printing technique, supervised by Film Effects VP, Don Weed, in which as many as 15 images were on the screen at once, won an Academy Award as Best Live Action Short Subject.

Film Effects also contributed importantly to the television field, providing theater quality effects for *Star Trek*, *Project UFO*, and others including the acclaimed ABC-TV Special, *Ray Bradbury's Infinite Horizons*.

Other major film credits include *My Fair Lady*, *The Great Race*, *Hawaii* (Academy nomination), *The Bible*, *Darling Lili*, *Airport*, *The Shape of Things to Come*, *Tobruk*, and *The Great Race*.

Dunn has also been active in the educational field, lecturing and teaching at universities and film festivals in many countries. In 1983 he conceived and co-authored, with George Turner, *The ASC Treasury of Visual Effects*. He is active with the Academy of Motion Picture Arts and Sciences of which he was a member of the Board of Governors, 1976-82, and chairman of the Cinematography Executive Committee and of the Special Effects Award Committee, 1977-79. He currently serves as a member of the Scientific and Technical Awards Main Committee and of its Grants Committee. He was president of the American Society of Cinematographers, 1977, 1979, was treasurer of the ASC until 1985, and serves on the Board of Governors and the Editorial Advisory Committee. Recently the Society of Motion Picture and Television Engineers made him an honorary member, its highest honor.

In addition to the awards for the Acme-Dunn Optical Printer, the Academy honored him with a Special Academy Award for Outstanding Service and Dedication in 1979 and the Gordon E. Sawyer Award for Highest Technical Achievement in 1985. Other honors include the Golden Hugo Award of the 8th Annual Chicago Film Festival, the Herbert T. Kalmus Gold Medal Award of the SMPTE (1971), a Special Citation of the SMPTE (1978), and a Doctor of Fine Arts degree of the San Francisco Art Institute.

White-haired and sturdy at 80, possessing a quick step and an accent that hasn't changed since he stepped off that train from Flatbush 60 years ago, Lin Dunn shows no sign of slowing down. He recently sold Film Effects to a group of special effects experts and is celebrating his "retirement" by working harder than ever while vowing to spend more time with his wife, Lucile, his four daughters and the grandchildren. His daughter, Nancy, is a former screen actress, and her son, Christopher George, represents the fourth generation of the family in the movie industry. He and his brother still perform with jazz bands on occasion and he keeps his fingers always upon the pulse of the ever-changing film industry. △

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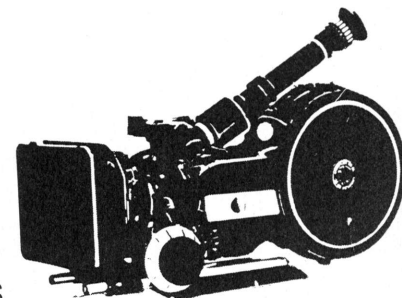


Anthony R. Palmieri, S.O.C., Camera Operator; Bill Loranger, 1st assistant; Michael Stradling, 2nd assistant

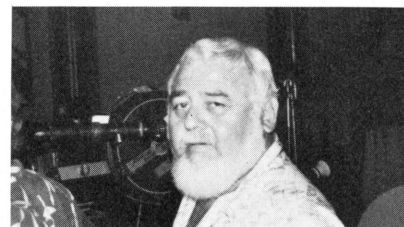
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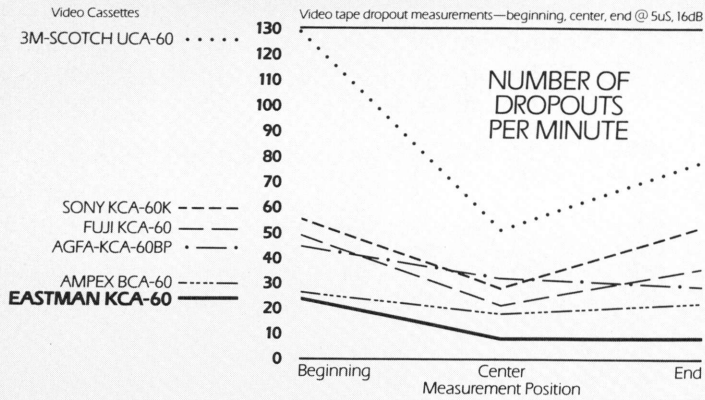
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Tyrannosaurus Lives in

My Science Project

by Jessica Horsting

Glowing pastel streamers of energy, angry dinosaurs, marauding bands of aliens, and an ever-expanding time-space energy warp; screenwriter Jonathan Betuel might have put a curb on some of his wild imaginings for *My Science Project* had he known it would be his responsibility to get them on film. Betuel had sold Touchstone Films his frenetic script about three teens who discover an extraterrestrial device that produces localized time warps – allowing all manner of

monsters and mutants into the present – then suggested to Disney executives he ought to direct.

A successful screenwriter, and novelist, Betuel's enthusiasm and familiarity with the fantasy genre won the confidence of Disney executives – although that confidence was conditional: he agreed to step aside if he didn't perform competently and waived final cut on the film.

"You come to recognize that a first-time director is the most expendable part of the equation."

But Betuel believed in the project and in the story: a high school senior can't meet the deadline for a school science project. He discovers a complicated-looking device in an old warehouse and "borrows" it, not knowing it was salvaged from an alien craft by the U.S. government. When he and his friends proudly present it to the instructor and activate it, the instructor is immediately de-rezzed into a space/time continuum and the high school becomes an inter-dimensional locus for the mobius loop of time. The gizmo seeks to complete a circuit with a nearby power plant and the teens have to deactivate it before they can gain enough power to really turn the world inside out.

Realizing he didn't have the expertise to make the complex film work, Betuel had to rely on those who did. But Betuel and his production designer, Disney veteran John Sheele, were stymied because the studio's special effects talent pool was currently divided among three demanding projects: *Baby*, *Black Cauldron*, and *Return to Oz*.

Not only would Betuel be commandeering camera time and staff from an already overburdened animation division, certain elements of his script demanded a technical level unavailable at the studio facilities. Betuel and Sheele approached studio execs with the proposal that some of the major effects work be farmed out to freelancers, arguing that the project might suffer if it had to be squeezed in between post-production work on the other major projects. Though there were some grumblings from middle management over the suggestion, Sheele and Betuel were persuasive.

Ultimately, they corralled an all-star line up: effects virtuosos Rick Baker and Doug Beswick were brought in for the model making; designer Ron Cobb was contacted for certain mechanical and alien concepts; Chris Walas, Greg Van der Veer, and a half dozen other craftsman who have distinguished themselves in the last few years were also wrangled for the project.

Although these necromancers weren't enough to save the film from box office oblivion, the screen illusions they conjured give substance to the Arthur C. Clarke aphroism "A sufficiently advanced technology is indistinguishable from magic."

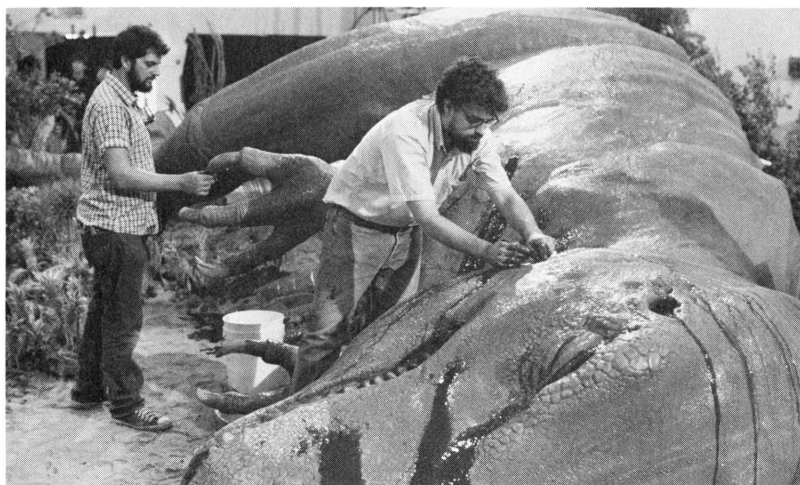
You will believe a dinosaur can roam the corridors of a suburban high school.

Betuel's script focused on two major elements that necessitated almost 200 specialty shots. The hero prop in the film – the gizmo – was conceived as a compact alien device capable of creating rifts in the fabric of time. Art director David Snyder found the gizmo problematic: "A lot more time was spent on the gizmo than we would have liked, because it was the key prop and the key element that would throw the school into the warp. Everyone was concerned that it be right. I was spending days and days with concepts until I suggested to Jonathan that we bring someone in from outside."

The "someone from outside" was noted production designer Ron Cobb, who designed the computer-animated effects for the Betuel-scripted *The Last Starfighter* and some elements of the title sequence for Spielberg's *Amazing Stories*. Snyder defined the problem for Cobb: "It had to work with animation and it had to work with the effects we were planning ... some of the light source emanating from the gizmo had to be exposed at all times to give lead lines for the animation effects. It had to be small enough to fit into a school locker, so we measured an actual locker and gave Cobb those dimensions."

Constructed by Apogee, the gizmo had some complicated elements; notably an internal Al-bright-Tesla globe – a new generation Tesla which shoots electricity through a thin atmosphere of inert noble gases, creating brightly colored streamers.

"The Tesla itself photographed at low light levels," observed Sheele, "so most shots are with a wide angle, open lens, balanced down for the Tesla. But you



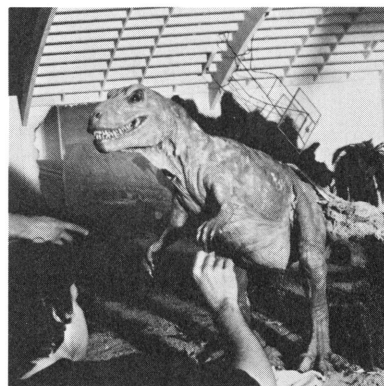
Scheele adds a special effect of a different sort to the fallen T rex. Below: Stop motion animator adjusts miniature T rex. Opposite page: Composite with all the electrical effects and bubble added.

couldn't boost the Tesla past a certain point and retain the definition on the streamers, so we knew we would need to augment the basic effect." Fortunately, this was one area where the Buena Vista studios had an ample – and available – talent pool. Headed by John Van Vleet and Chris Culver, the staff boasted *Tron* and *Something Wicked This Way Comes* veterans Barry Cook, Ed Coffee and Gail Fox. They became the principal animators for the extensive lighting effects, although Greg Van der Veer was eventually brought in to help supervise and coordinate the opticals.

"The Tesla was always interesting to look at," notes John Sheele, "and we didn't always have to burn something in as an effect ... but the aura and the further expansion of the gizmo's power was something we debated and tried to backpedal away from having to portray. We opted for a transitory bubble envelope effect which suggests the moment the gizmo's energy is released."

Scenes involving the bubble were photo-rotoscoped utilizing the backlit animation exposure system developed for *Tron*. Frames to be optically enhanced were projected and enlarged on paper as a guideline for the multi-layer work to be done on the frame – much as an illustrator's "lucy" enlarger expands and projects an image for precision work.

"This system was ideal," says Sheele, "because we wanted to texture the effects, layer them



and add more subtlety and complexity than we felt was available through just opticals.

"It does put the burden of production on the animation stand," he adds, "but the animators know what they're doing."

Special animated lighting effects accompanied most of the globe-related scenes, as well as the climactic scene in which the teenagers pile into a car and race an "energy pulse" to a power station. Unfortunately, both audiences and critics had difficulty with the notion that an energy surge – which likely travels at the speed of light – could be overtaken by a '68 G.T.O.

Betuel's other temperamental star has been a favorite heavy since the earliest days of filmmaking – though he's come a long way since Willis O'Brien's early stop-motion monsters in 1925's *The Lost World*. After guesting for George Pal and Ray Harryhausen for a number of years, the snarling face of *Tyran-*

nosaurus rex once again fills the screen in *My Science Project*.

The climactic time warp event occurs when the teenage boys face their most menacing adversary. The gizmo creates a rift at the end of a school corridor. It suddenly sprouts lush foliage and the teens stumble into the huge, hungry *T. rex*.

Betuel and Sheele initially okayed the construction of a full-sized model, but were dissatisfied with the result. Then studio executives suggested saving costs by going with a man-in-a-suit-dinosaur. Sheele was quick to advise Betuel to contact effects innovator Rick Baker.

Baker, however, was so involved in other projects, he instead recommended colleague Doug Beswick handle the chores while agreeing to act as a consultant for the mechanical effects work.

Beswick was an ILM veteran as well and eagerly rose to the challenge. "I began by talking to Rick and consulting with John Sheele to determine exactly what the puppet had to do," he reveals, "and decided on a rod-cable combination – using cables for every function but the legs, which were operated by rods."

Barely taking a breath, Beswick rattled off the statistics on the two and a half foot beast: "There are 36 cables coming out of the main support rod. He's got eyebrows, eyelids, jaws, tongue, head and neck movement, a bladder in the throat and a pneumatic chest mechanical. Then there are two back joints, twelve cables in the tail for three section movement, a function in each leg and three toes that bend with each foot." Beswick added that it required seven operators for the 20 or so cuts involving *rex*.

The puppet was first mocked-up and tested for a month to determine where the joints should be for the most fluid movement. Because this kind of puppet animation requires the model to move on camera, rather than having movement simulated frame by frame, the initial testing period is

critical to a believable special effect. "My four and a half year-old daughter critiques mechanical creatures," notes Sheele, "and she knows the difference between a good effect and a man in a rubber suit."

Beswick and his team members finished the model in 17 weeks. Beswick gave a play-by-play: "Tom Hester sculpted the entire puppet in about two weeks. He used an oil-based clay and sculpted about 12 to 14 hours a day to finish on time. Tim Lawrence then made Ultracal molds used to cast the foam parts. Tony Gardner handled the foam. Phil Naterio and I designed the machining, though he executed most of the ideas. Sean MacEnroe helped in the mold-making and painted the creature."

Beswick is very proud of his team, particularly because of the remarkable dedication they developed for the project: "About halfway through, we decided that if we started working Saturdays too, we could get it done faster . . . John felt it would be very helpful if we could, so we all came in and got it done a week ahead of schedule."

Most of the *T. rex* model work was limited to the articulated puppet, filmed at a rate of 60 frames per second. "It was a comfortable speed for the puppeteers", notes Beswick, "and when you saw it projected at the regular 24 frames per second, it gave the feeling of weight and size." There were no "giant" heads – large, fully articulated, precision detailed heads for close-ups – nor were there any "big" models for the Rex to be matched with as often occurs with extended model work. Betuel wanted the tyrannosaurus to remain an element of the plot, rather than overwhelm the story – or the budget. Betuel did not let the one big model go to waste though – it was used as the corpse at the end of the segment.

Though the gizmo and *T. Rex* commanded a lion's share of the effects budget, there was extensive secondary model work and

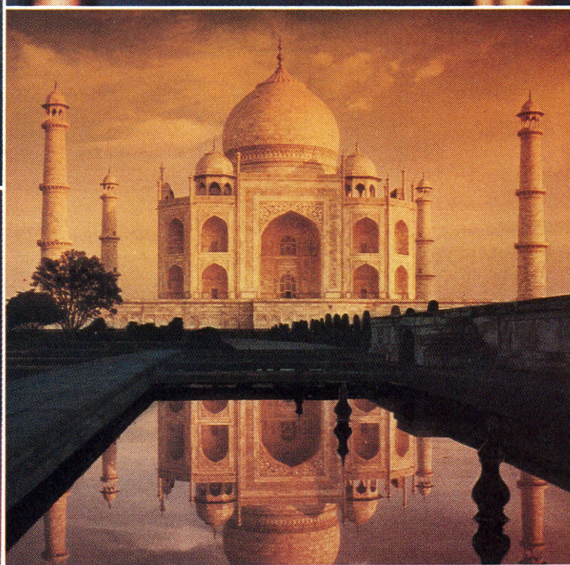
makeup effects. Make-up effects artist Lance Anderson was called in by department head Bob Schiffer to create some of the monstrosities unleashed by the alien device. Anderson was asked to provide a Neanderthal man, an alien, a monster warrior and a couple of mutants. Under Schiffer's direction, Anderson began the designs, but complains, "They kept doing rewrites and just as I would finish a sculpture (preparatory to a mold) they'd write it out of the script." The monster warrior was completed and received enthusiastically, but proved to be disappointing on film and was discarded.

Eventually, Anderson's contributions were pared down to the Neanderthal and the mutants – "Those turned out to be real fast make-ups that we did right there on the lot. We made the appliances in a couple of days and put them right on the actors."

Several other models and effects were planned and constructed, though they did not survive the final cut of 98 minutes. Sheele explains: "Chris Walas also did some work for us, a group of aliens that were to be incidental in the background during one of the scenes. They were good, clever designs . . . but they stood out too much. In many cases, things we were just trying to throw in for spice and accent became too much, so it became a matter of thinning out, of leaving fewer things in so the *T. rex* scene – the climax of all this – wouldn't have its impact diluted by a lot of incidental characters."

Betuel was able to bring his first film in ahead of schedule and under the \$10.2 million budget, which was a commendable achievement for any director, particularly on an effects-heavy film. But he takes little credit for the success: "I was really fortunate to have (cinematographer) David Walsh and David Snyder. And John Steele assembled – what can I say? – the Rambo Strike Force of special effects!"

△
Jessica Horsting is a Los Angeles free lance writer.



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ENEMY MINE

Creating Hell on Fyrine IV

by Nora Lee

"It felt like there was a special effect in every scene (of *Enemy Mine*) when we finished, but this is not a special effects picture..." warned Rolf Zehetbauer, production designer on Twentieth Century Fox's Christmas release, *Enemy Mine*. Filmed on location in Lanzarote, The Canary Islands and on a stage built expressly for the production at Bavaria Studios in Germany, *Enemy Mine* is a futuristic story similar to an older

film called *Hell in the Pacific* made in 1969.

Sixteen years ago Toshio Mifune and Lee Marvin find themselves on an island, one a Japanese soldier and the other an American soldier. In the film they overcome their natural enmity enough to develop a healthy respect for each other. In 1985 Dennis Quaid and Lou Gossett are thrown somewhere into Earth's future and discover that hell is really on the

Planet Fyrine IV. After a dogfight in space the two warriors crash land in a hostile place that is only a special effect. To help them create an appropriately hellish island, Zehetbauer and director Wolfgang Petersen employed Industrial Light & Magic.

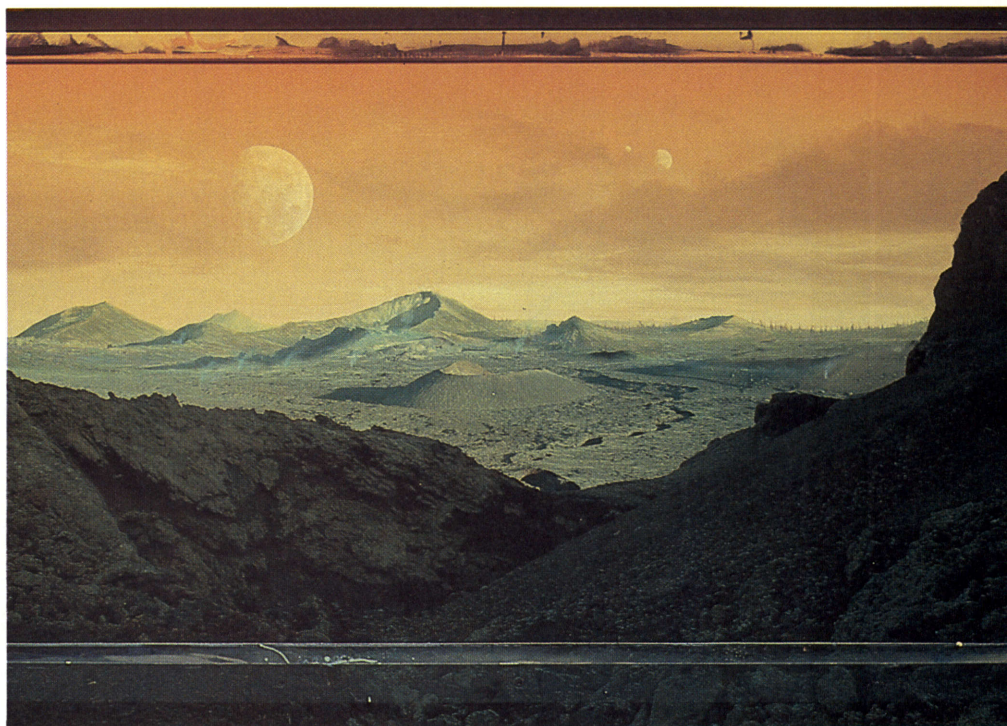
ILM matte artist Chris Evans and cameraman Craig Barron worked with Zehetbauer and Petersen to create the establishing shots of the alien planet. In

roughly 15 paintings, Evans removed the blue sky of Pacific coastal Africa and replaced it with the orange, red, or green skies of Fyrine IV, including a massive pink planet that often hangs ominously above the landscapes. In the opening sequences, director of visual effects photography Don Dow designed and choreographed the dog fight that sets up the story of mutual respect and survival. Bruce Nicholson and the optical department composited blue screen elements shot in Germany with paintings done at ILM. Starfields and shadows came from the animation department. Altogether there are about 80 composites done at ILM in *Enemy Mine*.

In a telephone interview with Zehetbauer from Munich, he said that the startling design of the picture "goes back to the early days of the production. . . . Here is a chance to create a planet that has never been seen. It shouldn't look dreamlike at all. It should look realistic on one side, but on the other side it should look fantastic." The look, according to Zehetbauer, is not based on the work of any artist, but comes from his imagination and the imagination of the designers working under him.

Zehetbauer has long been associated with both Petersen and the studio, Bavaria Atelier. In anticipation of the kind of work that would be necessary for *Enemy Mine*, the studio built continental Europe's largest sound stage and named it after Petersen. The stage was necessary to accommodate the enormous amount of technical effects and the alien sets. For Zehetbauer, creating realistic sets on the stage was the biggest challenge. "The story is very realistic and if the sets are not believable, it could be very bad for the movie . . ." he said.

The sets included a volcanic crest with a lake and with a hydraulic camera platform in the lake, a crater complete with bubbling lava and a forest of petrified trees. The physical effects on this picture covered the known and the unknown and the stage was



Composite of Lanzarote and a painted sky. Below: Example of latent image plate with sky matted out. Opposite page: Wade Childress, camera assistant, pulls the holdout matte off the sun element.

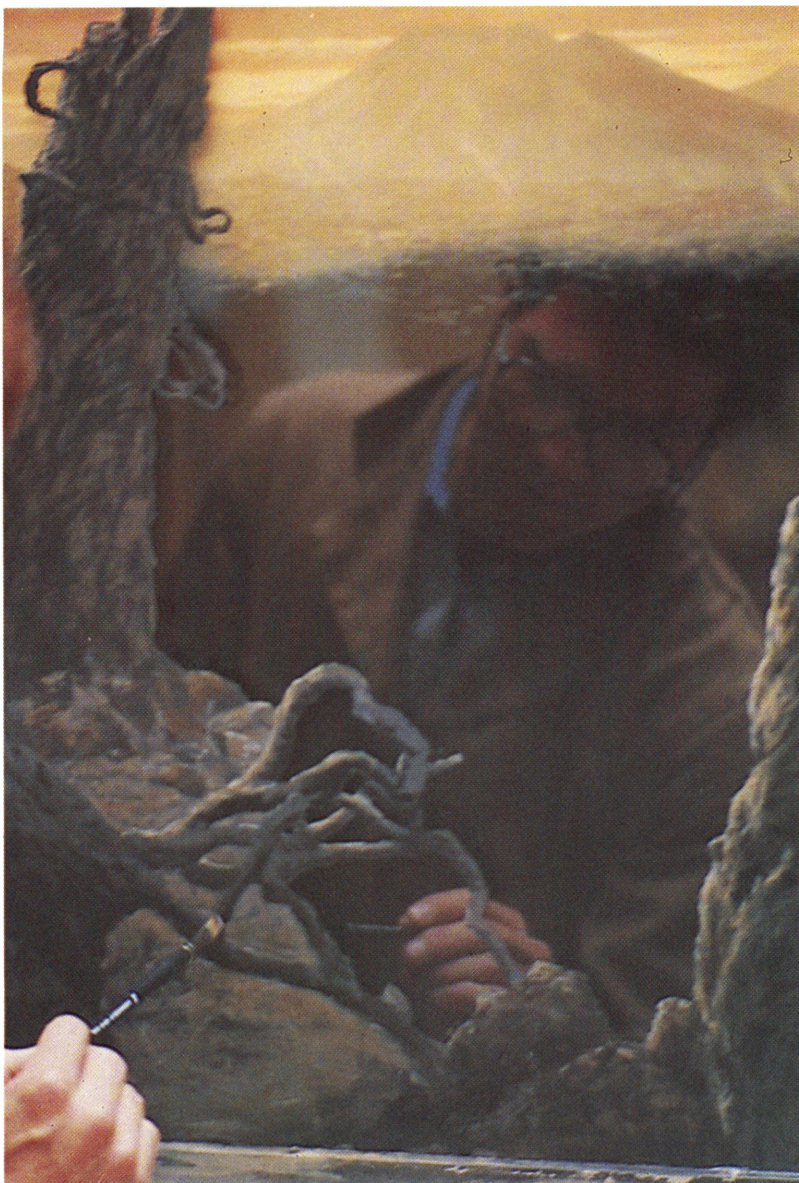
technically equipped so that the touch of a button would bring on rainstorms, blizzards, meteor showers, floods, smoke, fires, etc.

The new stage also came complete with the largest blue screen in the world. With the consultation of Brian Johnson and Dennis Bartlett of England, Bavaria Studios built three new blue screens equipping the studio to handle just about any type of blue screen work that could be required. The largest one is 30 feet by 90 feet. Each is backlit with

fluorescent tubes which are run on inverters that stabilize the polarity of the light and keep them running for up to ten hours. Only one person is needed to run the whole system.

Besides breaking in all three of the new blue screens, Zehetbauer built a large number of remarkable miniature landscapes. They constantly filled three smaller stages with the model sets. "There were over 70 different set-ups. We would build one then and tear it down as the schedule dic-

Evans works over foreground glass painting.



tated. To show a planet never seen before, you cannot build all things in real size." The landscapes averaged 45 feet by 80 feet in area and the planes and spaceships were built in a 1:6 scale. They were very large because Zehetbauer believes that size is critical when building models. "The larger the model, the better the quality and the more believability." The model crew at Bavaria averages five people – five very busy people.

Meanwhile, the work at ILM began early in the picture. Chris Evans and Craig Barron, along with camera assistant Wade Childress accompanied the crew to Lanzarote. It was there that a

lot of the latent image plates were shot. Barron explained, "They didn't rely entirely on matte paintings and sets for the alien landscapes. They did a lot of shooting on Lanzarote off northwest Africa. The Canary Islands are volcanic islands and on Lanzarote alone, there are over 150 volcanoes. They all erupted in the 1750s, I think."

Chris Evans said, "Essentially, our job on *Enemy Mine* was to create alien landscapes for the long shots – in addition to the Lanzarote footage. So for the big establishing shots and the master shots they needed matte paintings of a giant sun, for instance, com-

ing up over the horizon. Fyrine IV's sun is 50 times larger than ours. The skies are golden and red . . . and all of this had to inter-cut with the miniatures they built in Bavaria."

The red skies were part of the design to make the alien world look harsh and fantastic. "But," explained Barron, "there is a problem with shooting things on earth and trying to make them look like they were shot under a red sky. The fill light and shadows are blue. The blue sky is there when you are photographing it. To just change to a red sky is complicated. It somehow makes everything look foreign, like it doesn't belong together. We struggled with it."

The lighting and the compositions were very different from what either Barron or Evans had done before. "In the *Star Wars* films the look of the alien planets is generally a subtle variation of something on the earth – a desert with maybe two suns rather than one. But Petersen wanted a really extraordinary look with these giant pink planets looming in the sky. It's really a fantastic outer space rather than a very believable outerspace," concluded Evans.

The outrageous volcanic shapes on Lanzarote provided the basis for the look of the planet, but Evans feels that the place was so strange that no one will believe that it exists as a natural wonder. Barron and Childress are very much aware of Lanzarote's realities. "We shot about a half a dozen latent image plates there, but it felt like many more because we had to lug a VistaVision camera up the side of a volcano."

Evans was there too, and recalled "standing on the rim of the volcano with a sheet metal wind protector with the camera set up inside it so we could shoot down into the volcano crater. Later we matted out the sky and replaced it with a green sky with very strange clouds. The actor is running down in it and we added pyro smoke coming up out of the crater."

The team experienced a few other difficulties. "Occasion-

ally we had to stop for tour buses,” recalled Barron. “We would get the matte all set, the sun is setting on this incredible landscape and here comes this big white tour bus!”

“That shot Craig is talking about was very interesting,” said Evans. “The actor, Dennis Quaid, has been walking through a forest of giant petrified trees. He comes to the end of the forest and he looks out across a broad plain of lava with craters in the distance and deep red sky. He sees in the distance the smoking wreckage of the enemy fighter plane. He wants to get to it so he can seek revenge on the other pilot, Drac (Lou Gossett), who killed his copilot. This was shot with a latent image foreground in Lanzarote. Quaid walked up onto a hillside and looked out.

“Later we matted out the sky and replaced it with a red cloud sky. At that point we have our major pre-composite. We sent that into our optical department. Since he is coming out of the petrified forest, Petersen wanted to see these big tree trunks sort of framing the shot. We painted those for a front light/back light composite with the optical pre-composite we have already sent in. We are also going to DX a glint of wreckage off in the distance and put in some black smoke coming up from it. So, it’s a two step compositing process.”

“We are trying to use the best of two worlds,” continued Barron. “The latent image is used to match the landscape extending out to the horizon – which is a very difficult blend – over a long area that changes subtly. It is a soft edge blend. That is where latent image is really great. The painter can paint into the live action a little bit and the live action is in the painting a little bit. It makes a perfect subtle, soft blend. That would be very difficult for the optical department to do. There would have to be a straight line on the horizon and it would have to match perfectly in tone above and below the line. On the other hand, we wanted hard edged mattes in the



Latent image techniques allow a soft edge blend.

foreground, but initially we just didn’t worry about the trees. We did the background first. Then we used front light/back light to get the trees into the foreground. So it’s using two different matting techniques for two different parts of the same painting.”

The film also employs combinations of rear projection and matte paintings. “A lot of the rear projection shots are of the enemy mining area in this crater with sunrises and giant moons and meteor showers in the sky at night,” continued Evans. “Wolfgang Petersen’s desire, as we have said, was for very bold, almost unbelievable otherworldly landscapes – where there are things like another planet in the sky and it almost half the size of the whole

sky. They look a lot like Chesley Bonestell paintings that we had to make look believable. It was difficult because now the general public has seen a lot of NASA photos of what Mars actually looks like and what the Earth looks like from space. We were competing with a heightened sense of reality in the public mind.”

The final challenge for the matte painting department is a really glorious shot near the end of the film. Evans said, “We shot a latent image plate at sunset with the lights sparkling all over the water. We put a hard edged articulate matte for the landscape elements of mountains and islands going out into the ocean on a pane of glass in front of the camera and in focus. There is a large area in



Modelmakers Wesley Seeds and John Reed ready BTA model for rubber mold. Below: Modelmaker Ira Keeler details a BTA.



the foreground that is matted out and into that area we rear projected a group of Dracs involved in a ritual.”

“Wherever possible, if we can get away without duping something like a sunset or a sky or the ocean, we will try to design the shot to take advantage of latent image,” concluded Barron. “Sometimes the old ways are the best way. It just looks really beautiful. The matte painters, like Chris Evans and Sean Joyce, have gotten to the point that what they paint looks so real, duping their paintings takes it a notch down and makes it look less believable. When you get some of these guys’

work in with latent image plates its just really fantastic.”

Meanwhile, Don Dow and the motion control crew were involved in some stiff competition – with themselves. “The challenge was to make *Enemy Mine* look different from *Star Wars*,” Dow said. “They wanted a dog fight-type battle with space vehicles, but they didn’t want it to look like *Star Wars*.” In order to research the way modern planes maneuver at altitudes of 50,000 feet or more and speeds of several hundred miles an hour, he studied the film *Threshold*. It is a flight demonstration tape of the Blue Angels and it showed Dow examples of the air-to-air maneuvers of

which the Navy planes are capable. He noted, “You are not aware of any speed because of the high altitude and the fact that they are traveling together with no references.

“Even so, we felt we had to show speed in the dog fight sequence, because they are fighting, not floating, and without the sense of speed it wouldn’t be very exciting. We decided that, rather than do what we did on *Star Wars* or *Star Trek* and shoot a backlit star-field for our backgrounds, we would try using our animation stand.”

In keeping with Petersen and Zehetbauer’s goal of a realistic future, Dow said, “we tried, in dealing with the models, to film them as if we were really out there in space filming them. The ships would be entering and exiting frames through pans or tilts. When we were studying the fighters, I learned some interesting things. I was never aware that you could turn a plane 90 degrees without it changing direction. That is, it can roll 90 degrees without changing direction. So we tried to incorporate that into our moves – the ships did a lot of rolls and yaws, but didn’t actually veer off or make a turn. There were times when the ships crossed each other. It was difficult to do, in that it was hard to keep the ships from looking like they were crabbing.

“A lot of our views of the ships were POV. Naturally, you will get some crabbing. You have to know how much of that you can get away with and how much you can’t before it begins to look phony. Maintaining those relationships was important.”

Shooting in space has always created a bit of a problem in lighting. Defining a source for the key light and rationalizing the fill light is usually a matter of cinematic license. For *Enemy Mine*, Dow actually went after the high contrast lighting that keeps appearing in the space photos sent back from the probes. “We used a bright key light and very low fill light. We did as much as we could and still get by with using blue screen. Then we just tried to cho-

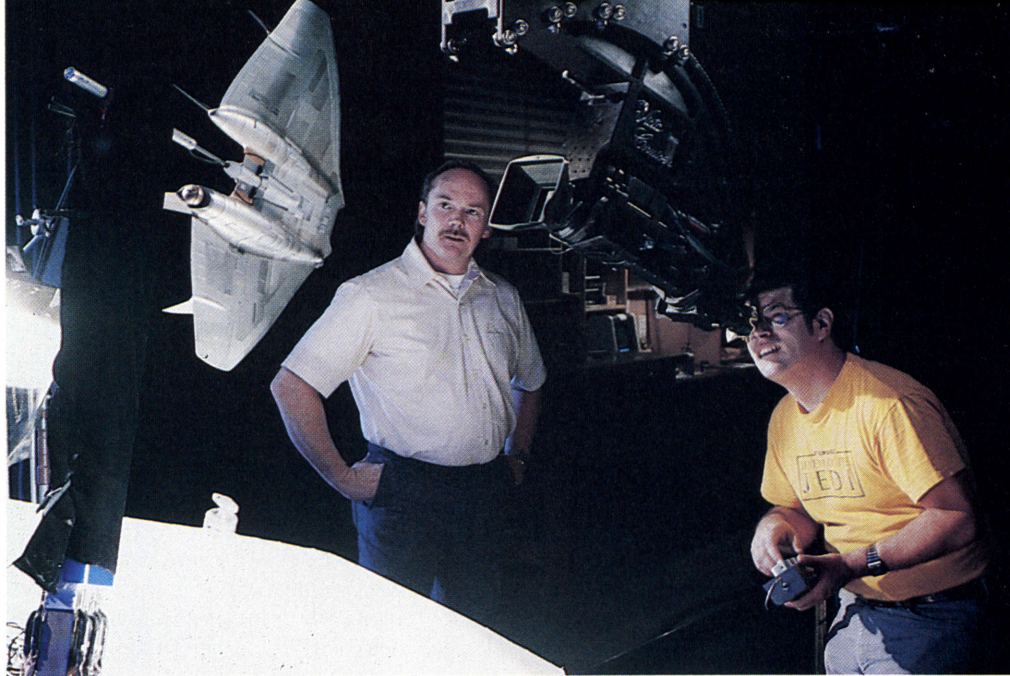
reograph the action with enough continuity so that we knew whether the key was on the right or on the left."

All of this preparation was for a sequence that deals primarily with two ships. One is piloted by Quaid and the other by Gossett. "The sequence starts out with 6 BTAs fighting 4 Dracs then 6 more Dracs appear on the scene," explained Dow. "Immediately we break off so that we are dealing with a one-on-one situation. They go into a dog fight and crash land on the planet and that is where our model shots end." The dog fight sequence serves as an introduction to the characters and the motivation for the rest of the film.

ILM is unusually open to innovation within the area of special effects. Bruce Nicholson reports that on *Enemy Mine* the effects team experimented with reproducing reflections in a blue screen element. "Generally it is not done at all. Now we have found we can reproduce reflections - say in a window - that look realistic. We went for that look in a lot of the cockpit shots, where we were looking over the shoulder of the pilot and we could see the reflection of the dashboard in the glass. Generally speaking, when we do cockpit shots, we remove the glass. This time we tried to do it with the glass in, which is tough, particularly if you have a curved surface, because it picks up the blue.

"We tried to have the reflection a little bit more pronounced than we actually wanted it in the end result," continued Nicholson. "Some of it is going to drop out. Usually, the subtler, the better. You don't want to draw too much attention to it."

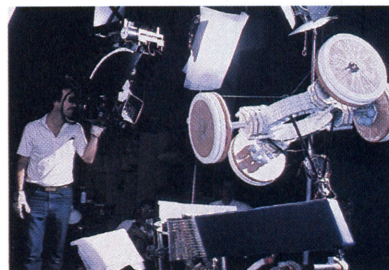
Another, more subtle addition to the effects repertoire is the ability to shoot miniature cracks in cockpit windows. "We had some shots where we actually had the two ships collide and the windows fractured. That was very difficult to do against blue screen, because the blue kicks off the cracked glass in all kinds of pecu-



liar ways. We did it with art work, rather than with an actual cracked glass. We did some tests with both art work and glass and the art work looked better because it was more in scale with the miniature cockpit we had built. The artwork, of course, does not refract light like the glass would," said Nicholson.

Nicholson also revived an optical trick learned on *Indiana Jones*. "There were some crash landings where we added in some vibrations optically. We had done that on *Indiana Jones* for the miniature mine car sequence. The difference for these shots was that they were point of view shots. You were looking out the window with a cameraman in the back seat, so to speak. The ship hit the surface and bounced around. The foreground vibrated, but the background had to vibrate differently because the camera was moving relative to all those things. So we had to put a different amount of shake into the foreground than into the background," concluded Nicholson.

Bruce Walters, one of the supervisors from the animation department, enjoyed working on *Enemy Mine* because it was his first opportunity to experiment extensively with a new animation stand. The stand was used on *Goonies* while Walters was working on *Explorers*. The new stand is



Don Dow and Selwyn Eddy III line up Drac ship for motion control shot. Below: Pat Sweeney readies space station for beauty pass.

not just state-of-the-art. According to Walters it is "probably the highest tech animation stand there is. It was designed by Mechanical Concepts and Bill Tondreau built the electronics. He did it as a showcase of his technology. It is half servo and half stepper motor-driven, so it does all kinds of things that no other animation stand is able to do.

"We shot all the starfields for *Enemy Mine* on it. We have never done that before and we match-moved the motion control moves from the stage. We took their shots and rotoed them down and match-moved them or we created our own moves. The process is very similar to what they do on stage except we are using two different kinds of computer systems.

"Our system has 32 channels and it is capable of blurs and streaks and the kinds of things stage cameras can't do or can't do easily. This camera can do all that all day long. Up until last Thanksgiving, we did all our effects on an

Oxberry stand and this one is about six times faster. We've been doing blue screen work on it and a lot of model work on it," Walters said.

There is a lot of versatility built into the new animation stand. It is capable of using different size art work and scaling moves to fit the art work. Moves can be overlaid, on top of each other to produce new moves. Walters explained, "If we had a move of something going through space and all of a sudden it was hit by some sort of a force that bounced it around, we can make a smooth move for the model and overlay a rough move and put them together so that we can make it shake or bounce and we can repeat that. We can take a part of one move, another move and a third move and just keep overlaying them so that we get the move we want instead of trying to figure them out on a point to point basis like you have to do on the Oxberry."

The new stand also makes the camera itself more versatile. "The Oxberry has two lenses, a 28mm and a 55mm and it has a mechanical follow focus. Mechanical Concepts stand has a servo follow focus so you can put any lens on it from 15mm to 2000mm and just type in what lens it is and it is in focus. That allows you to do a lot of effects with different size art just by changing the lenses and increasing the range.

Walters continued, "The art work bed and the camera spin, so when Jay Riddle, one of our cameramen, is doing a fly through space he can get a lot more realistic flying motions than we can get on the Oxberry. That ability has helped us with the work we did on *Enemy Mine*. The starfields and nebulas that we shot were matte paintings that were painted at two different scales. We used the same program but we scaled the program differently to fit each pass. Jay also shot some of the planets from transparencies. He shot them in a special low contrast way so that when they were composited

they looked like original photography.

"All of that had to be match-moved to the dog fight sequences which were incredibly complex. We would get an element from one of those sequences and then Jay and Don Dow had to look over the sequence and determine how the starfield moved in relationship to the models. The way those models moved – one peeling away from another or you start out following one ship and then shift over to another – point of view changed all the time. A lot of times when there was a shot with a spaceship, the ship was just sitting in the frame and the starfield was the only thing moving. You were getting all your sense of speed from the movement of the field.

"Sometimes if you are going fast enough the starfield can't be big enough to get the whole move so we had to figure out some trick way to get from one starfield to another without the audience noticing. Since stars are supposed to be at infinity we weren't doing any zooms. All our stars were locked off at a certain size and we did all the moves with pans, tilts, and rotations," said Walters.

Finally there is a very large and very underrated department at ILM that contributes something to every single production that moves through the studio. It is the "other half" of the animation department. The half that uses traditional animation and the almost ancient art of rotoscoping to make sure that the magic that is created on the stage is not revealed by some inadvertent model pylon popping in and out of a shot.

Ellen Lichtwardt supervises the twelve people in the rotoscoping and traditional animation department – one of the largest and busiest departments at ILM. "On *Enemy Mine* most of what we are doing is rotoscoping. There are a lot of ships flying around. Sometimes it reminds me of the *Star Wars* movies," said Lichtwardt.

Every blue screen element shot comes through her department so that the pylons that hold each of the model ships can be rotoed out leaving the ship suspended magically in space. Not everyone, not even every animator, has the patience or the skill for such a painstaking chore. "There is a technical end that you must get down in order to be able to do it. And then there is a certain finesse that some people learn from doing it and some never do. You apply that finesse to painting mattes and matte lines and you quickly learn it is extremely precise and technical work. It could drive you crazy. It takes a lot of patience.

"Any time that line changes or wavers one little bit," continued Lichtwardt, "it is blown up and magnified on the screen and you can see the line. One little thing can throw the whole shot off. It really is amazing, when you consider how many mattes are hand created instead of computer generated, that they work as well as they do."

One major advantage of a professional rotoscoping department is that the stage crew can get away with a lot more. "They can overlap things and do trickier things if they know they can rely on our department to pull it out. Instead of just cleaning up people's messes, the rotoscoping and animation department has become a contributing department," Lichtwardt said.

The high quality of the contributions of all the departments at ILM and the contributions of the crew in Munich keep the special effects in *Enemy Mine* in their place. Each effect must be integrated into the story in the same way that the costumes and make-up are. No special effects just for the sake of special effects. Only then can a film with as many effects as this one stand up to Zehetbauer's claim that "it isn't a special effects picture." △

Nora Lee is a regular contributor to these pages.

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Photos by Virgil Mirano

Vampires Next Door for

FRIGHT NIGHT

by Adam Eisenberg

In *Fright Night*, vampires and various other kinds of undead are alive and well and living in the small town of Rancho Corvallis. For young Charley Brewster, a teenage fan of horror films, this fact results in a number of restless nights and several bloodcurdling battles when he tries to rid his neighborhood of these unwanted beasts. Accomplishing such a task is not easy, and Charley (William Ragsdale) soon finds himself in a life-and-death struggle to save his family, his friends and his first love.

Before such creatures of the night could haunt Charley's

hometown, however, they first had to be created by writer and first-time director Tom Holland (screenwriter of *Psycho II*, *Cloak & Dagger*). Then to bring his visions to life, Holland sought out the aid of Richard Edlund's Boss Film Corporation and the Entertainment Effects Group, a move that he says helped give his relatively low-budget film (\$9.5 million) a big-budget look.

"Following the large scale productions of *Ghostbusters* and 2010," Edlund says, "*Fright Night* seemed like the perfect project for us. We had our creature shop all set up and, although there were

projects in negotiations, we didn't have any other work at the time. Also, it afforded us the opportunity to show we could do a small project. As opposed to doing a \$5 to \$8 million budget, we were dealing with somewhat less than \$1 million, so it was a good chance to show our flexibility."

To help him do so, Edlund enlisted the aid of visual effects art director John Bruno to help design the shots, and supervisors from the various departments of EEG. While *Fright Night* would only involve about fifty effects shots (as opposed to the 193 in *Ghostbusters*), the film called for

a variety of different techniques from matte paintings and animation to elaborate monsters created by the creature shop.

Fright Night opens with an graceful camera-oriented shot that involved still photographs, matte paintings and a moving live action plate. As Neil Krepela, matte department supervisor, explains: "The film begins on a shot of the moon. The director wanted a little bit of red tinge in the clouds floating by the moon. We hold on that for a moment and we hear a wolf howl. Then we tilt down from that into black. Through the black we come down onto a nighttime view of a small town and, as we tilt down, we pick up a pan and move across this painting into a live action crane shot. The transition is smooth, and we continue moving across a street, past the vampire's house and into the driveway of Charley's house next door. We then move up to Charley's second-story bedroom window and onto a TV set inside on which is playing a tacky vampire film.

"The moon was actually a real high resolution photograph from the Lick Observatory, which I shot with a little diffusion and a foreground painting of clouds," Krepela continues. "We panned by this and then tilted down into black. Then we rewound the film in the camera, started in black at the top of a matte painting of the town, and then continued the tilt down onto the town. Across the bottom corner, we added the moving silhouette of a tree that was actually shot blowing in the breeze in a vacant lot next door to our stages. I shot the tree on hi-con film as an additional element and added the same move I would make on the town painting except that I moved the camera a little bit off nodal. I then bipacked the silhouette of the tree in the camera when I did the final composite so that, as we tilted down onto the town and then started panning across, the tree added more perspective. As we panned across more, we also added a painted tree



Evil Ed in transition form with a stake through his heart. Center: Evil Ed with half his face made-up to look wolf-like and the other half to look boy-like. Below—Hand that melts to reveal wolf's paw. Sequence was filmed in reverse. Opposite page: Evil Ed is transformed into a wolf.

to create more depth in the overall painting."

As the shot continues, the camera moves across the painting and onto a rear-projected plate of the exterior of the hero's house. Krepela shot this background plate on the Disney backlot where exteriors of Charley's neighborhood were filmed. Using a Titan crane, the camera smoothly tracked up into the window of Charley's room where the vampire film was playing on the TV set. This film was actually a videotape that was synced up during the shot to play at the proper speed. In the sequence, the soundtrack of this video movie is heard over the entire shot, beginning with the wolf howl at the start, and then proceeding through various dialogue



exchanges. In addition to this opening sequence, the film also features a second matte painting of a daytime view of the town. Both views were painted by Matthew Yuricich and his assistant, Michelle Moen.

Fright Night involved the work of all the various depart-



Dubbed Billy Bones by the crew, the zombie was composited with melting hands, including a human one with make-up on the palm. Center: "I'm melting!" Billy Bones. Below: Billy Bones and fans, including monster makers Steve Johnson and Teresa Burkett.



ments but, as Edlund notes, "the film was in a large part the work of the monster shop, which was headed by Steve Johnson and Randall William Cook." Charley's first encounter with Jerry the vampire (played by Chris Sarandon), involved a wounding trick. In the

scene, the creature of the night holds the boy in a deadly throat grip until Charley desperately impales the vampire's hand with a very sharp pencil. Jerry immediately shrieks out with pain, then observes his hand to find the pencil impaled completely through. In reality, the pencil was part of a foam latex appliance designed by Johnson that the actor wore on the palm of his hand. The appliance went all the way around his hand so that the eraser end of the pencil could be seen sticking out of the top, and the point could be seen sticking out of his palm.

In the sequence, a shot was designed so that Sarandon could turn his hand over and reveal the pencil sticking out of both sides, reinforcing the reality of the effect. Then, grabbing the point end of the pencil (actually a telescoping pencil) he appears to pull it out. In reality, the telescoping pencil grew about three inches as he was pulling on it while, at the same time, the eraser end on the other side of his hand was pulled off by a hidden wire so that when he turned his hand back over, all that remained was an empty, smoking hole.

As Johnson notes, "I got the idea from a fantasy sequence in *Excalibur* when I guess Lancelot pulls the sword out and he kind of rolls to one side and yanks the tip off. When I originally saw the film, that scene just floored me. I couldn't believe it. I rented the

tape and watched it twenty times before I realized what they had done. I was so impressed with it that I decided to try it myself."

The next major effects sequence in *Fright Night* involves a wolf-into-man transformation that occurs when Roddy McDowall as horror movie star Peter Vincent drives a stake through the heart of Evil Ed. Ed, played by Stephen Geoffreys, is one of Charley's friends who early in the picture gets bitten by the vampire. In the transformation scene he pursues Peter Vincent in the form of a wolf, only to encounter his own death when he is impaled with the stake. As the sequence evolves, the dying wolf pulls itself under a stairwell and slowly makes the painful transition back to its human form.

In recent years, similar transformation sequences have been feature attractions in such movies as *An American Werewolf in London* and *The Howling*. This notion of the effects as "star" was one Edlund was not eager to repeat in *Fright Night*.

"My feeling about transformation shots is that they just stop a movie dead," he explains. "Ever since the original werewolf series of dissolves, they have in one sense said to the audience, 'Ok, no matter what action was going on, now we're going to watch this special effect.' The result is that everybody's magnifying glasses are out looking at it. Inevitably, there are problems with that. But I think the wolf sequence for *Fright Night* is well incorporated into the action. It turned out to be really excellent, and that was really Steve Johnson's ball of wax."

From the start, the *Fright Night* transformation had the novelty of being different from those that have been done before because, instead of men turning into wolves as seen in *American Werewolf* and *The Howling*, Evil Ed transforms himself from a wolf back into a man. To make the sequence even more interesting, Johnson, who assisted special

makeup designer Rick Baker on *American Werewolf*, suggested a new stylistic way to show the body parts of the wolf changing.

"Ever since *American Werewolf* I have been interested in trying something different from the typical transformation heads that just stretch out symmetrically," he recalls. "So I approached Tom Holland with the idea of an asymmetrical transformation where the body parts did not change evenly or at the same rates of speed. Besides the fact that I thought it would be more naturalistic and something that hadn't been seen before, Tom was really going for empathy for the character. He wasn't supposed to be a snarling slobbering monster that people would not feel sorry for. So it kind of works along the principle Charles Laughton or any of the actors playing *The Hunchback of Notre Dame* followed—that is, if he's deformed and whimpering, you're going to feel a lot more sorry for him.

"We also figured that since he was changing asymmetrically in form, why would he necessarily be changing the same way. So we did the insert shots with different techniques. For instance, in one shot, we did something like a meltable reverse effect. We did a closeup of a hand that we made out of rubber removable pullaway tendons and bones and muscles layers, and a meltable gelatin skin on the outside. We melted this outer skin and, as it started getting soupy, we pulled everything away and underneath we had a wolf paw. Then we reversed the film so that it started out as a paw which then suddenly grows all the anatomically correct parts of a boy's hand."

To bring these various body parts to life, Johnson used many of the techniques first established by Baker including mechanically-operated foam rubber puppet rigs. In addition, actor Stephen Geoffreys found himself wearing a variety of elaborate foam rubber appliances and, when he was fully made up, he had to sit



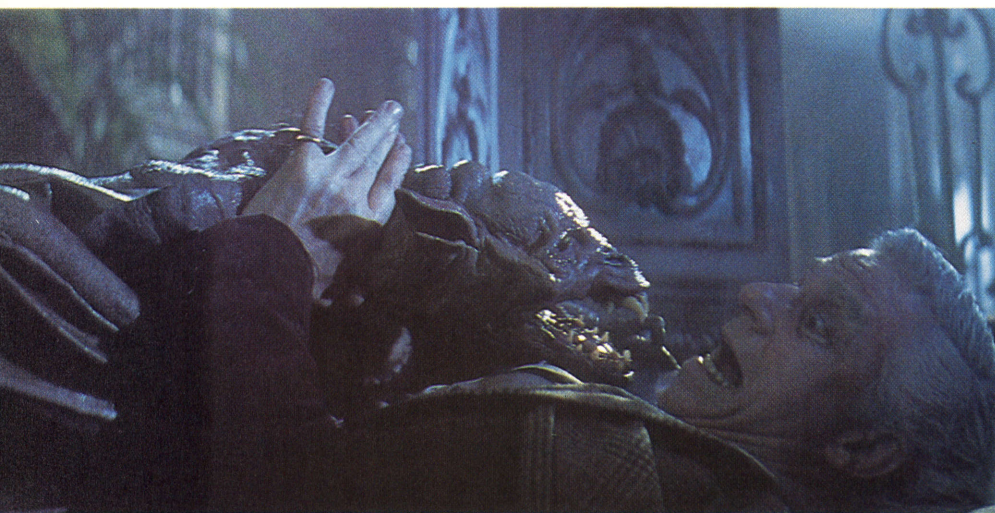
Composite of bluescreened bat. Below—Bill Neil checking the light on the rubber bat.

through 17 hours of application work before he could go before the cameras.

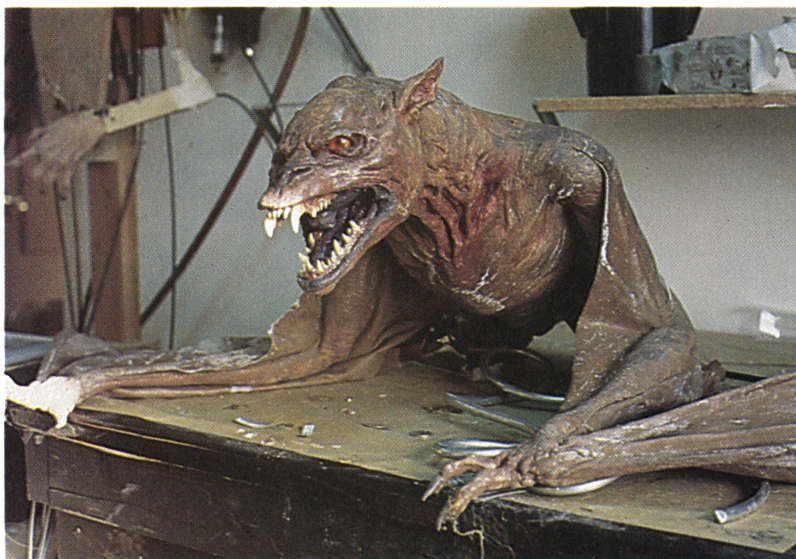
"We kept changing things around for the audience when we filmed the sequence," Johnson adds. "One time the actor's real legs were out, while another time they were through the floor and replaced by monstrous legs. One time the creature has normal legs and one time it has weird ones. Stephen always had one of his own arms behind him out of camera range so a rod-puppeted thin, weird one could be seen. Stephen also had his head bent down so a mask could be attached to the top of it to give him a long, skinny dog neck. In the scene, the character's body is really distorted and deformed. He

looked sickly, so I think people will feel sorry for him."

Besides the asymmetrical aspects of the transformation, Edlund suggested a lighting approach that also greatly altered the look of the sequence. During the battle between Vincent and the wolf, the wolf is impaled and then crashes over a balcony, hits a chandelier and then falls to the floor below. By hitting the chandelier, which was the principal light source in the scene, the wolf causes it to start swinging back and forth. As a result, some of the transformation that followed was in shadow and some in light, enabling Johnson and his crew to further enhance the bizarreness of the scene.



Roddy McDowall, the vampire killer, gets a close look at Randall Cook's version of the real thing. Below: One of the various bat puppets.



"We had Stephen wear one foam rubber mask that was wolf-like on one side and like a sick, little boy on the other side," Johnson explains. "He was rolling around on the floor and, since he was turning from a wolf to a boy, we filmed him with the human side pressed against the floor so that it was all in shadow. All you could see was this really weird distorted wolf face. Then, when the chandelier swung over in a couple of frames of darkness, he swung his head back so that suddenly you could see the boy's side. This proved to be a nice little camera trick made possible by the swinging of the light."

"Having the chandelier swing really improved the sequence a thousand percent," adds

Bill Neil, visual effects cameraman. "If that light had not been swinging and the figure not going in and out of shadow, we could not have held on certain shots as long and it would not have played nearly as well. The fact that you were seeing just brief glimpses of that material made it work out well."

The scene occurs in Charley's house and, to accommodate the filming of the effects, the stairway section of the set built on a sound stage at The Burbank Studios was chainsawed off and brought to EEG. "We used the same light source that the first unit had established," Neil notes. "Jan Kiesser shot the material of Roddy McDowall over the boy's shoulder on the set. And then we pulled the stairway and part of the wall here to our facility and shot the Roddy

McDowall point of view. Jan Kiesser actually shot them with all of our technicians. It was sort of a postproduction shooting with a minimal crew. Jan was lighting and so the framing and so forth was all Jan's framing.

"I think it is very important that in effects work, the framing and composition not change radically from the first-unit footage so I always encourage the director of photography and the production camera operator to participate in the framing and composition of our work. Part of my challenge in doing effects photography is to be able to analyze what the DP has done with his lighting and filmic approach so that our material integrates with his as smoothly as possible," Neil says.

The elaborateness of the effects themselves created some problems for Neil because while the swinging chandelier helped add to the mood of the scene, it also added to the complexity of the shots.

"The close up material we were shooting at radically different speeds," he notes. "For instance, the hand transformation from the paw to the boy's hand was shot I think at one frame a second, so the swing of the light source had to be timed appropriately. We figured out roughly what it should be and Randy Cook, who is among the best stop motion animators, worked the chandelier and it worked out quite well with his timing and timing scale. It worked out real well."

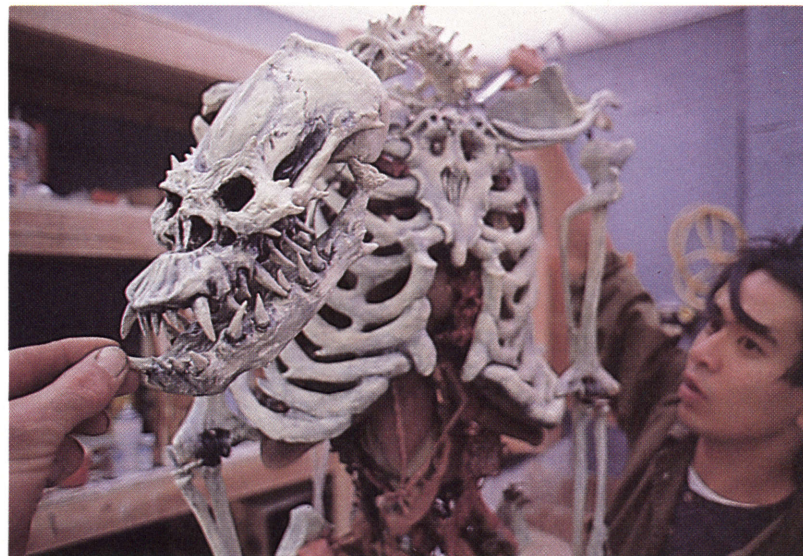
Once Evil Ed has been killed, Peter Vincent goes next door to Jerry's house to help Charley do battle with the vampire and his soulless assistant Billy Cole (played by Jonathan Stark). Nicknamed Billy Bones by the effects crew, this assistant deteriorates in front of our eyes after Charley impales him with a stake through the heart. In the scene, Billy looks on with horror as he raises his hands up and sees them melt away. Then, in a closeup, we see his head melt down to its skeleton skull.

To create the effect of Billy's messy demise, Johnson and Rob Cantrell took different approaches with each of Billy's two hands. For one of them, "We took assistant Teresa Burkett and made her palm up to look like the back of Billy's hand," Johnson recalls. "We built an understructure of hard rubber that looked like muscles and bones, and then put a soft, foam rubber on the outside of that with wire pulls all over it. It was pre-torn so that when we started pulling all of the outer flesh off, you would see the bones and muscles below. Then, as that happened, we pumped ooze out (colored methycelulose, a food thickener) and then the girl started bending her hand forward. Since the front of her hand was made to look like the back of Billy's, it looked like the hand was just peeling backwards and all the bones were melting."

For the other hand, a more skeletal approach was taken. First, foam rubber was placed over a boney understructure. Then, tubes placed inside the hand enabled a green oozing material to be pumped through so that the hand would appear to be melting away as the specially rigged foam rubber was peeled off the skeletal fingers by wire pulls.

In a similar fashion, Johnson, Cantrell and Cook used a rubber head for the shot where Billy's face melts away. "We went in and rigged a rubber head with a gelatin plug," Cook explains. "We then cut part of the rubber head out and replaced that part with gelatin because Tom wanted a specific area to melt. So, most of the head was made out of a heat resistant substance, while the rest was made out of the gelatin which would deteriorate. After the underskull was rigged, Steve and I rigged the gelatin. We then used heat guns to melt the gelatin while we filmed at 12 frames per second.

"We didn't want to do a fast rapid melt like the ones seen in *Raiders of the Lost Ark*, and we didn't want it to look waxy," he continues. "So we built in differ-



Fabricator Maki Kiota with skeleton representing Sarandon caught in transition from man to bat.

ent consistencies of gelatin, and we put in lumps of thicker gelatin that would melt more slowly. We also put in different colors of gelatin so that the guy would turn from a skin color to a horrid green as his face melted away."

During the filming of the sequence, the hands and the closeup head were filmed against a bluescreen. For the early shots of the actor watching his hands dissolve, Stark was filmed against a blue smoky background on the set and then the melting hands were bluescreened into the plate. The closeup head was, in turn, matted into a separate plate of the blue smoky background. The task of matting all the various elements together fell upon optical supervisor Mark Vargo and his staff.

"Originally we were only going to do four optical shots for *Fright Night*," Vargo recalls, "but the number swelled into a pretty decent size task as the film progressed. I think the most challenging sequence was the Billy Bones because the shots had to be composited very carefully. For instance, when his hands melt, they have to appear to be right there next to the actor. Fortunately, they shot the background behind the actor as an out of focus blue smoke far in the background, and that was the guide for the color."

While the blue background provided a good guide to

determine the proper color balance for the various bluescreened elements in the sequence, it also created a little havoc with the matting itself.

"In the sequence, the actor on the set was backlit with blue light which is kind of a conflict when it comes to bluescreen," Vargo explains. "If you shoot an object against a bluescreen and rim light it with blue light, your matte would fall apart there. As a result, we couldn't duplicate the set photography the same way, yet we still needed to simulate that blue rim light. So what Bill Neil did when he filmed the hands and the closeup melting head was he used a white rim light while artificially biasing the color balance of the key lights with a 1/2 CTO. This added a degree of warmth similar to an 85 filter to the hands and face itself. As a result the white rim light remained unaffected by this added orange tone, but the elements themselves looked horribly tanned. Then, when I timed out the shot, I pulled the whole scene to the cool side and the skin-tones became less tan for a proper match to the actor, while the white rim light went to blue, matching the rim light on the set. This was a questionable technique which we'd never used before, but it worked.

"Another factor we had to take into account was that Jan



Vampire disintegrates with the help of various gas jets and colored flames. Opposite page: Sarandon consumed by green fire. Center: Magnesium crystals imbedded in the rubber and gelatin creature cause multi-colored flames. Below: Vampire's last gasp.

shot Billy on the set with smoke and a #2 LC filter, so we had to first diffuse the bluescreen element and then flash it and then throw it slightly out of focus to match the on-set characteristics. So, all in all, the three techniques that we employed were manipulating the color, throwing the elements out of focus, and flashing and diffusing them."

"The main reason we shot the Billy Bones stuff blue screen," Johnson adds, "was as a luxury to us because we did not have the time to finish the thing before the set was struck. So we just shot the plate of the set beforehand and waited until we finished preparing the effects and then shot them against blue screen. It really made it easier on us, and Mark Vargo did an incredible job. Some of the best blue screen work I have ever seen. The hands looked like they were right there next to the actor. And, on the melting head, the drips actually rotoed from the melting flesh really nicely. You would just swear they were all there."

Once Billy is gone, Charley and Vincent fight one last battle with the vampire itself. At one point during the struggle, Jerry is struck by a beam of sunlight and jumps over a bannister. Immediately, the camera pans ahead of him and onto his shadow on a background wall, which reveals his shape changing into that of a very large bat. Then, as the shot continues, the camera pan slows down and the bat itself comes back into

frame and flies off with lightning speed.

To accomplish this effect, which once again reflected Edlund's notion that transformations should be integrated into the action of the moment, a stuntman was filmed against a bluescreen as he simulated being thrown off a bannister. Then Neil Krepela shot a three quarter scale model of the background wall. Once the correct movement and timing of the camera pan on the wall was established, a rough pencil sketch of the animated shadow was drawn by animation department co-supervisor Terry Windell, and a full scale bat was filmed against bluescreen for the tail end of the shot. Then Sean Newton drew the actual shadow animation that connected the beginning of the shot (the stuntman) with the end (the actual bat).

The design for the bat itself was created by Cook, who tried to take a different approach from the squeaking, small bats seen in most vampire films. "I have always objected to the bats in the old movies as being a little bit too mundane," he says, "so I thought it would be interesting to first keep the creature about the same size as the human vampire. In the script it specified that it was an enormous bat so I figured, why not just shift its mass around a little bit while retaining certain characteristics of the actor's appearance in the face. So we made it basically a fantasy bat.

"The problem that arose was that while I wanted to incorporate some of the actor's look into the face of the bat, we had to sculpt the bat before the part of the lead vampire had even been cast," he continued. "So I ended up sculpting the bat hoping that through paint or some other stroke of fortune, we would be able to cause the audience to make that association. Fortunately, I was able to design Chris Sarandon's vampire makeup and work backwards from the bat design, incorporating certain elements of my bat sculpture into my Chris

Sarandon vampire sculpture. It was sort of a backwards way to work, but it was the best that we could do under the circumstances." The makeup on Chris Sarandon, used to show some transformation on his face when he got angry, was created using foam-rubber pieces, and applied on the set by makeup artist Ken Diaz.

To construct the full-scale bat itself, Cook first sculpted the creature full scale with an 8-foot wingspan, and then built it out of foam latex and filmed against a bluescreen. Since this full-scale bat was wire operated and was posable but featured no internal mechanization, a hand-puppeted version was constructed for closeups of the bat's face.

"To take some of the curse off the fact that the full-scale bat was a marionette, we shot it one frame at a time," Cook notes. "This enabled us to control the movements with a greater degree of accuracy and finesse than would have been possible if we had shot it in real time. We wanted to avoid the old Universal Studios bat-on-a-string effect or what you've seen in films like *House of Dracula*, and if we had shot it in real time it would have been jerky and looked like those rubber bats only bigger and worse because it was bigger. So we shot it very slowly. We made the bat flap in what appeared to be slow motion, and we shot it at about a frame per second. There is one shot where he zips by the camera which we shot a little bit quicker at quarter speed - 6 frames per second - and that worked too. That latitude from one to six frames per second seemed to be the best for our needs."

Once Jerry has turned into the bat, he first attacks Peter Vincent and then darts off down to the basement in search of his coffin. Naturally, Charley and Vincent quickly follow close behind. In the final battle scene, Jerry is caught by a beam of light from the rising sun, blown back against a wall in his basement, and incinerated by Thaine Morris in a burst of green flame.

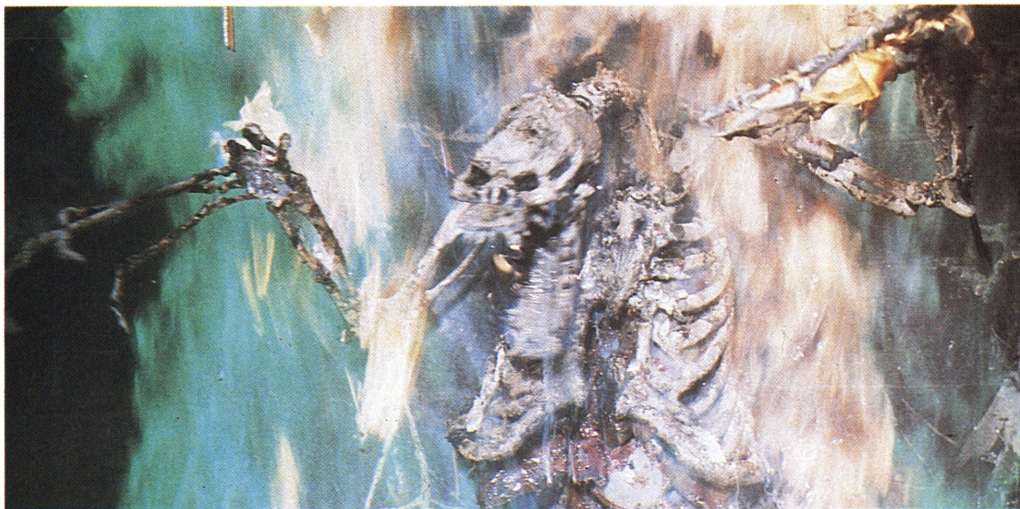
"For the beginning of the shot, Thaine built an inverted set and dropped a stuntman so he could really have a lot of impact," Johnson recalled. "Then we cut to a fully-puppeted dummy we had constructed out of liquid flash-paper. Thaine then rigged a charge in its chest so that it would start burning in the heart and then the whole thing would just flash away. Then we cut to a closeup of his face burning away and the skull coming out. Then we cut back to a fully puppeted demon skeleton that Mark Wilson worked on. It was just really, really nice. We thought it would be real scary and horrific to have Jerry trying to change back into a bat as he was dying so we made this second skeleton real bat-like as if he were trying to change back, but could not complete the transition."

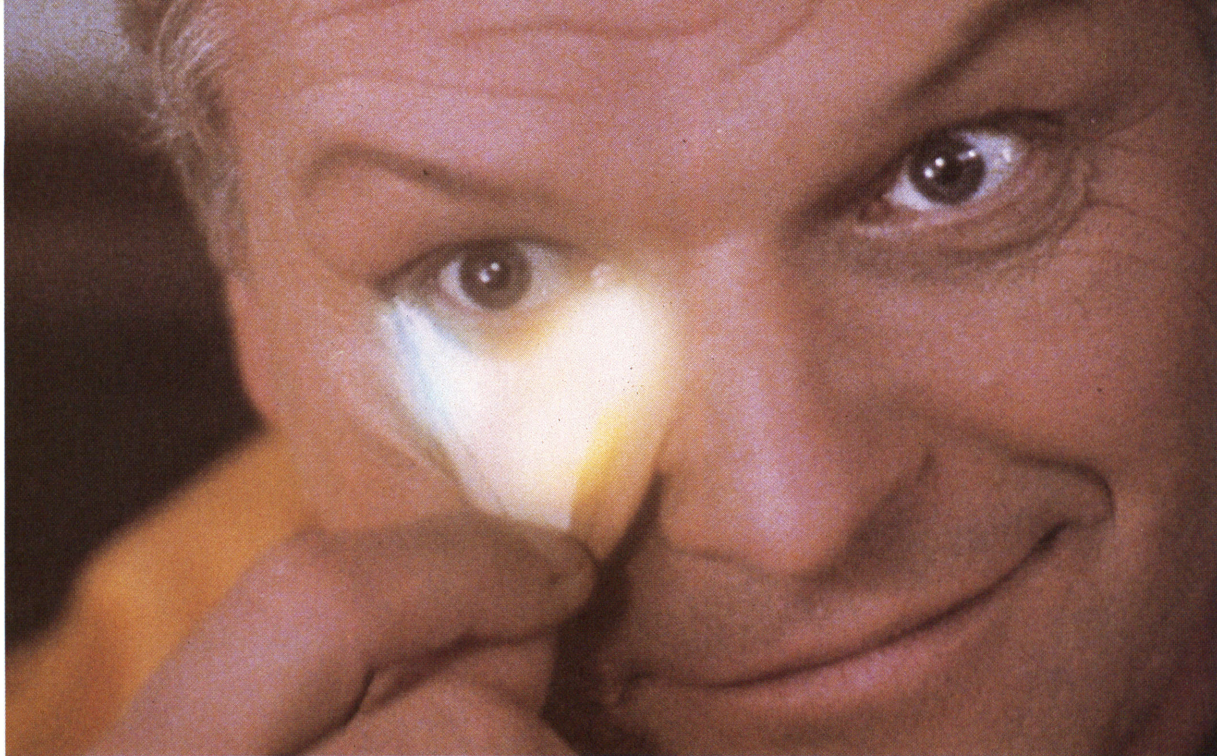
"This final form was made with bondo and acrylics. The chest, the rib cage were changed from a typical human form, and the legs were made shorter while the spinal column was longer. It really looked creepy and we put all kinds of stretching skin on it, and about 10 pumping organs inside that pumped until they burned. And Thaine gave me some magnesium tablets and some titanium powder that we mixed into wax and stuck all over it so that when the green flame shot out from below, it set off all of these sparking things. They added a degree of fantasy to it because we got a Disney-like image of green fire from below while the body itself burned orange with all these sparks."

"They really did excellent work," Tom Holland notes in retrospect. "Also, I like them very much. I really am fond of those guys because at first they didn't know me and I didn't know them. But as we got to know each other and trust each other, they began to support my vision and to find ways to make it work. They became tremendously supportive and would take what I gave them and improve on it one million percent."

△

Adam Eisenberg is a free lance Los Angeles writer.





Photos by Kerry Nordquist/ILM

COCOON

Aliens Can Be Beautiful

by George Turner

It would be impossible to overestimate the value imparted to *Cocoon* by Industrial Light & Magic, creators of the visual effects. The effects team was headed by Ken Ralston, visual effects supervisor.

The picture is a fantasy laced with about equal parts of humor and drama. A group of senior citizens existing at an old folks' center in Florida encounters and eventually befriends a detachment of aliens from another galaxy. Although disguised as earthlings, the visitors are quite unlike earth creatures when they remove their humanoid husks. They also are blessed with eternal life. Eventually a number of the

earthlings accept the aliens' invitation to return with them to their world. Their boat is lifted into a gigantic mother ship, which carries them away to a new life.

"*Cocoon* encompassed almost every kind of effect there is," Ralston enthused. "We had a lot of input from Ron and the Zanucks and the working relationship was unusually good. We got along great; even when they were terrified about what I was doing they let me alone because they *had* to trust me at some point. We had a very short time schedule and an awful lot to do. It wasn't supposed to be released until Christmas, and we wound up cutting ourselves short so we could get it out before

the summer rush. As the film started coming together we all realized it seemed more of a summer film than a Christmas film.

"My involvement, as usual, was the pre-production and designing all the effects for the show, and give input as to what I thought would work and wouldn't work visually. We storyboarded all the effects here – Phil Norwood did them, and he had a lot to do with the show. We went to Florida for a month or so and shot all the background plates. That was very good experience; it was great to be on the set with all those seasoned professionals and watch actors that I had been seeing on the screen for years."

Working with Don Peterman, ASC, director of photography of the main unit, was a rewarding aspect of the picture, according to Ralston. "Much of our work is hard because we have to match the deliberately fanciful and artificial atmospheres created by the cinematographers," he explained. "Peterman's photography on *Cocoon* was a lot more simplistic, not in how he shot it but because he kept the compositions and color more natural looking. Don's a master of natural light photography. He and I worked together on commercials at Cascade Pictures 15 years ago. On *Cocoon* sometimes he was working at such low light levels that we were forced to use fast 94 stock instead of 47. There is so much going on in those shots – aliens flying around the room and so on – that it takes your mind off of how grainy some of them actually are.

"While doing the plate photography in Florida, I came back here just once to see what was happening in the model department. Then I went back and finished up the plates with Scott Farrar and Bob Hill on the camera crew. Laurie Vermont was there too, as coordinator. We returned to ILM and got into the motion control stuff. There was a lot more of that than I thought there would be, because there was just no other way to achieve many of the effects. All of the boat shots were done in motion control, with stop-motion. There is no stop-motion on the aliens, but there is some on all the people on the back of the boat and also on the front in a couple of shots where the boat is pulling up. We were very pleased with how that came out. I was on another camera shooting motion control scenes – some of the space shots, the Atlantis shot seen briefly at the beginning of the show, and anything else I could catch up. There were a lot more little bits and pieces than I expected."

Ralston spoke highly of artist Ralph McQuarrie who, he said, "did a lot of the show. He even designed the pool house and did a lot of pre-production work



Opposite: Brian Dennehy poses for an 80s version of "here's looking at you, kid." Above: K. Ralston works with a human in an alien suit. Below: Make-up artist adds finishing touches to alien head.

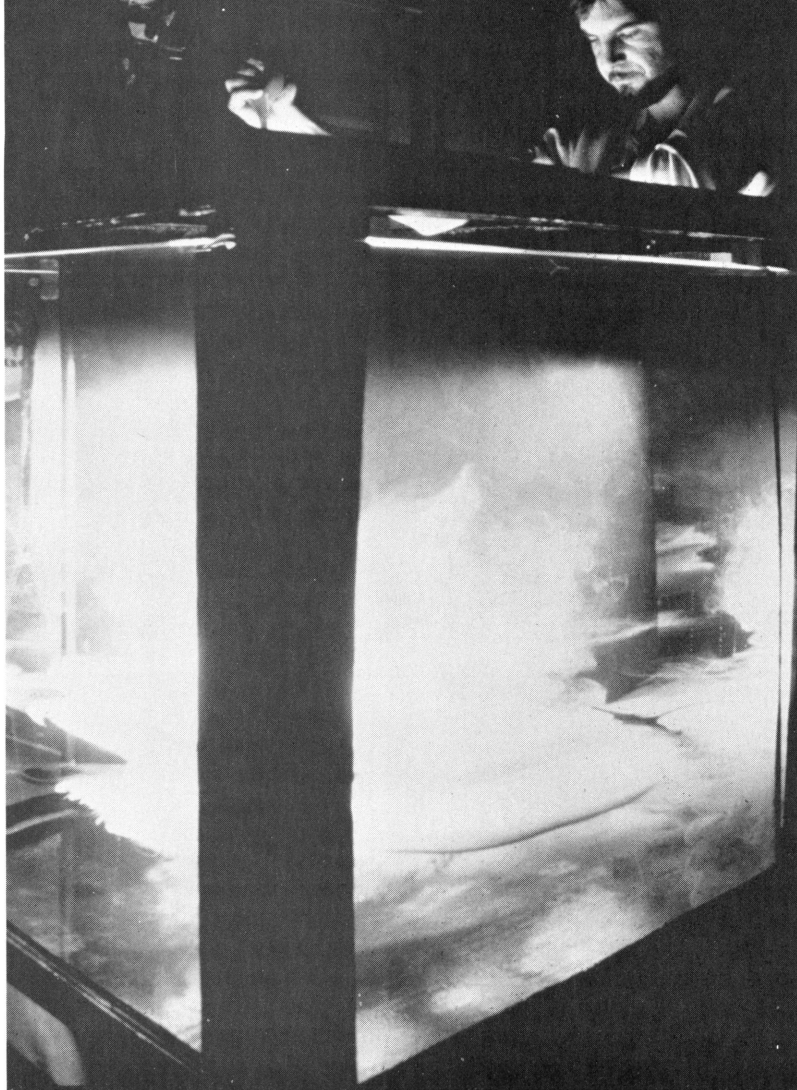
that was never utilized – fascinating stuff that either couldn't be done or somehow couldn't fit. He did a lot to get people to thinking."

A change of directors after production had commenced was one reason for some shifting of ideas from the original concept, Ralston said. "At first it started off with Bob Zemeckis and we had two or three meetings with him, and then for some reason he got pulled from the project – I think he had to redo something on *Romancing the Stone*. Then Ron came in and his input was a little different, but not drastically so, and some things changed because of that. Bob's film would have

been a lot different and it also would have been a good film. I can't stress enough how important his initial work was to the show. He set a direction and we tried to go that way the best we could, but there were some things it wasn't feasible to get into.

"We got into all the blue screen photography with the aliens quickly, because that had to happen pretty fast so we could start doing all the other work. That was about two weeks' work and it went very smoothly. We had it all organized so that we didn't waste any time. Then all the more horrible technical work started to come in."

Ralston adds dyes to the cloud tank.



Cloud effects were important to several key sequences, according to Ralston. "Some were pyrotechnics, some were sculpted fiber-filled clouds, some were done in a tank. We used multiple exposures to create a diffused, interesting sort of movement to the clouds. We used a tank on the side shots of the big formation building up. When we went inside we went into a big tube filled with fiber. The camera was rotated for most of the other shots, but for this we had to rotate the tube. We used four or five slightly different camera positions so it was all sort of moving within itself, and diffused heavily. A cloud tank is so unpredictable that it took us forever to get each particular element. I would go over there and we'd set up and shoot, and I'd leave and come back in five hours when it was ready to do one

more take! Anything could go wrong, and it usually did, but we were happy with the way it came out and it worked well in the context of the whole show.

Ralston emphasized that one of the more important aspects of visual effects work is the maintenance of a visual style which remains in concert with the overall concept of a show. "It was difficult, for example, to create spectacular effects like those at the end of the film and still keep an integrity with what Don was shooting," he said. "I had to hold true or it would have stood out as being a whole different set of shots. The shots were so mind-boggling that I had to simplify compositions sometimes and—in designing the saucer, for instance—keep things simpler and not so high-tech as some of our work."

Warren Franklin, ILM general manager, was equally adamant that each film should have its particular look throughout. "We try to make every film look different, so people won't say, 'Aw, it looks like the same old kind of thing.' We try to give everything its own look which is appropriate to the film rather than try to impose a style from ILM. We let the directors decide what they want to have on the screen. If you look at all the effects we've done this year, put together a reel of them all, it's amazing to see the variety.

"When a script comes in we try to keep an open mind about what things we might be able to do and look at it from a lot of different perspectives as to the various techniques that might be applied to it," Franklin said. "We have an advantage in having five different effects supervisors with many different approaches. We try to get everybody together and try to come up with something that satisfies the budget requirements as well as what would work best. Sometimes these aren't the same thing and we have to balance them out. We want to do whatever is right for a particular film rather than having to do the same things for every film."

Bill Kimberlin, special effects editor on *Cocoon*, is one of three practitioners of this highly specialized field at ILM. "There are Mike Gleason, Howie Stein and myself," Kimberlin related. "And we have someone who is in charge of handling all the negatives that come to the company and two assistants who handle projection and all the incidentals of editing. We keep track of thousands of pieces of film, and when we have four or five different shows coming through at the same time and each show has between 60 and 120 elements, it adds up.

"We found that the best way to do it was to assign one editor to one effects director, then almost anybody can come to him and he'll know what's going on. He can say, 'this is where we are with this shot and that is what we have yet to do.' One of the best

things about this company is that it's organized. It's a complex organization doing a lot more than just an optical house would do, because we're shooting our own things and have special requirements, but there are production coordinators galore that push all these things through and follow up on the details."

Kimberlin described the rising field of effects editing:

"It has grown in proportion to effects. In the early days the effects director usually shot it himself and knew how it went together. As it became more complicated, just keeping track of everything, controlling the handling of the film, became important.

As the shots themselves became more complicated, the editor's role escalated further. When *Star Wars* was made, a big effects scene consisted of a ship against a starfield with lights and engine passes. By the time we got to *Jedi* we had multiple ships, planets, explosions. Perhaps the most important thing is that until recently people usually didn't have to think about tying together a series of effects shots. Now we have not only the products within the frame but we must have continuity. If a ship is going at a given speed, the next cut has to be consistent. If there's an explosion in the first scene there has to be some carryover into the second – and, of course it can only be shot as two totally separate entities. We edit more in layers than in linear sequences.

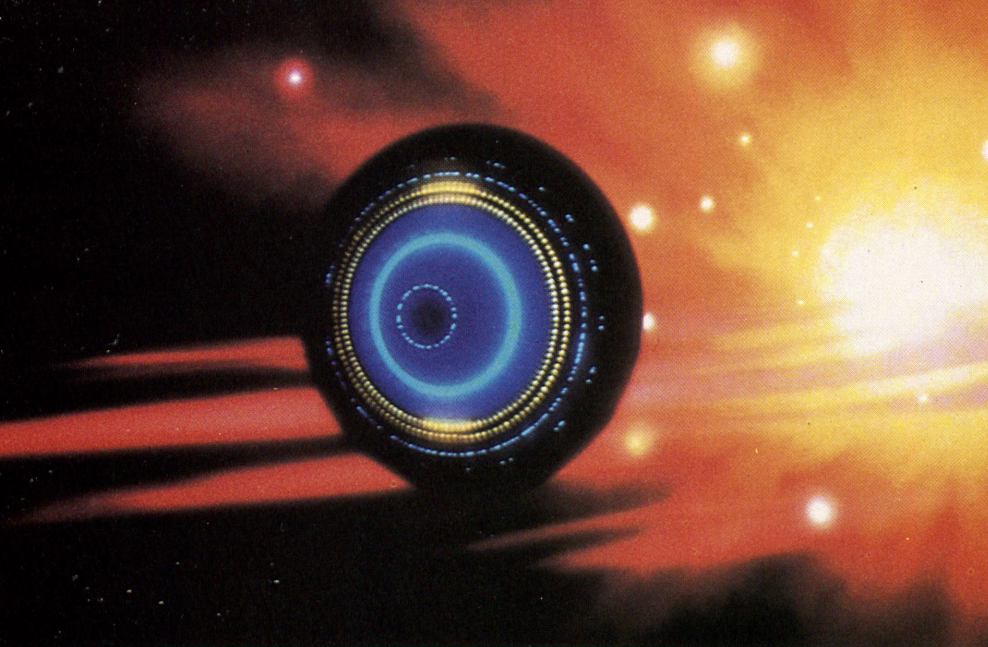
"We pretty well put the show together from the time it reaches the camera department," according to Kimberlin. "The effects director and the director of the picture figure out how to do the effects and then make the shots, whereupon all the elements that comprise the shot will land in this department. Sometimes it's extremely well thought out and they know exactly what they want, so it's stapled together and goes on to the next department.

"But sometimes, because it's too early on, we have to get started when we don't know the



Optically enhanced alien comes out of her skin. Center: Animated and optically enhanced essence of Tahnee Welch investigates Guttenberg. Below: Alien sheds his skin in this composite.





Antarean spaceship takes off with its unusual cargo.

exact requirements or the exact length, so they shoot a lot of film and do it a bunch of different ways, and then we get down the line and they say, 'Okay, this is really what we want now.' Then it's the effects editor's job to make it work with what was shot. The films change and grow as they go along."

The evolution of a scene in *Cocoon* was cited by Kimberlin as an illustration. "Here we had live-action actors who were supposed to interact with aliens. So we had a plate of the live action actors playing cards, and then Ken and Ron Howard shot an alien against a blue screen on our big stage, playing cards by himself. When we got both of those elements back, we did a quick black and white temporary composite, took the work prints and stuck them together to see how the alien was going to fit in there and see if we could make him work with the actors as if he was talking with them and throwing in a poker chip.

"This gives the director something to look at and cut in with his live action, and he can say, 'Well, it's really too small or it's moving too fast, let's try a different take.' Or, 'I don't like the way he's reacting, it doesn't seem like he's talking to them.' and we can change the sync between the alien and the live action actors. Those temporary composites are

what you can have in common to talk about and decide about changes, because it's going to be a long time before anybody sees anything in color. By the time they see it in color, if they have to correct a lot of things, there may not be time."

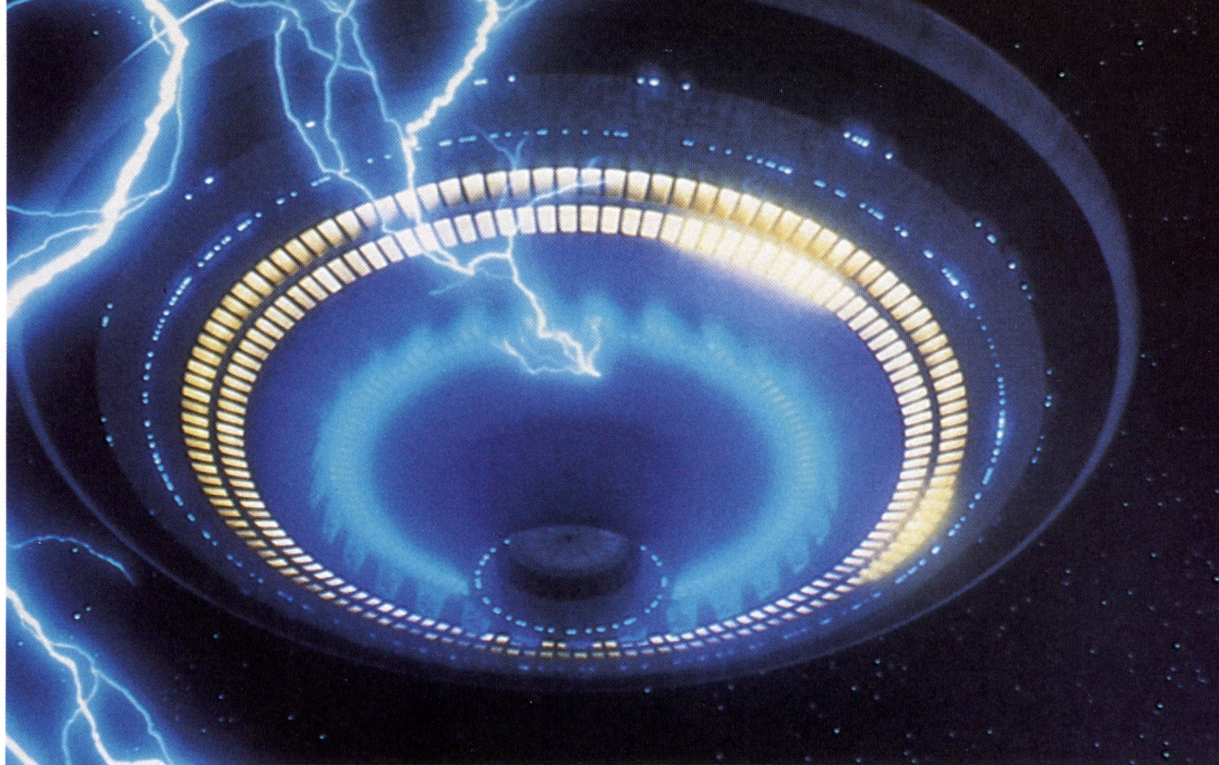
Kimberlin explained how the temporary composites are made:

"When the main company is on the set, we move in with our VistaVision cameras and shoot the backgrounds so we have something on 8-perf. [The VistaVision frame is eight perforations wide on 35mm film] The work prints will then come back in 8-perf., and then when we shoot something in blue screen it'll also be in 8-perf., whether it be a space ship or an actor. We take work prints of those elements and edit them in such a way that they can be composited on an optical printer. Instead of using the negatives as composite elements, we just use work prints and that gives a pretty funky looking black and white image. In fact, there'll be all kinds of extraneous things in the scene - light stands and that kind of thing - and when you get a lot of this it gets pretty confusing. When the *final* shot is composited, they use the negative and make multiple passes through the printer onto one piece of raw stock, which will be developed and printed onto one piece of 4-perf.

[normal 35mm. frame] for projection. Normal editing staffs aren't used to looking at our temporary composites, so we try to talk to the live action editor before the show starts; 'This is how we're going to do things and this will help you to evaluate what we're sending you. This is what to look for.' It *usually* works.

"We have Moviolas that run 8-perf and VistaVision elements and others for running 35mm composites. Sometimes we do a show in 4-perf, as was the case with *E. T.*, where there were no VistaVision plates. Basically, every element that's shot that's going to have anything to do with effects will pass through this department, so this is the Grand Central Station of the company. When the camera people are shooting space ships or stop-motion monsters, they shoot black and white quick tests before they shoot in color and they run in and use the 8-perf Moviolas, which are set up so they can bipack elements that have already been shot. When it comes time for the editors to put it together, we usually talk with the camera people and ask, 'All right, when you shot this and you work with this other element, what kind of a sync relationship were you thinking of?'

"I thought we'd have a big problem with *Cocoon*, because, for instance, we had a love sequence where we had things whipping around the room. It worked fairly easily, perhaps because we focused on it in the beginning and said, 'Okay, this might be a problem so let's be careful about it.' It's always what you don't think about that gets you. Oftentimes, a shot we think will be very hard will go together easily, and then you can beat seemingly innocuous little shots to death and they still don't get approval. That's how it works as we look at the dailies that we shot the day before. As we get toward the end of the production the optical department will start turning out composites that we've been working on for the better part of a year. Then the effects director will look



Animated lightning added to approaching model spaceship.

at them back and forth, literally inch by inch, and look for flaws. One great thing about George Lucas is that he knows when to stop beating the horse and say it's fine the way it is."

Storyboards, Kimberlin noted, are much more important in the special effects field than in live action work, and are continually revised as production progresses. "When a storyboard becomes obsolete, we make blow-ups of new scenes or have the art department sketch new ones. It amounts to doing all sorts of tracings and drawings, trying to fit explosions and things into the original scene that were shot somewhere else three months later. You're always concerned with trying to maintain the correct scale, speed, height and proportion. Trying to make these things work together takes a lot of effort. About 90% is the guy who's shooting it and how he shoots it, but if it doesn't work when we get down to the wire, then we have to come up with some way to make it look right. There are a zillion tricks in editing and opticals."

An unusual optical effect used often in *Cocoon* is the depiction of the aliens as they appear when they peel off their human

disguises. Without the coverings they seem to be sources of brilliant light, modified somewhat by dimly seen physical details and coruscating textures.

"It's a very complicated process," Ralston commented. "We weren't sure how to do it at first. There was some discussion of using front projection materials, and a number of people who didn't know how to shoot the effects were trying to get me to do that. It wouldn't have worked because the aliens were so white anyway that f.p. material would have been a worse material to use with the blue screen. We debated using it and projecting some effects onto the aliens, but it wasn't a subtle enough area - we would have lost everything. Animation was debated, too.

"Sometimes the people involved want you to tell them a million times why something they're thinking of isn't going to work, then when you're done they still aren't sure what you're talking about. Finally it's necessary to say, 'Just trust me,' and they *did* for most of the show.

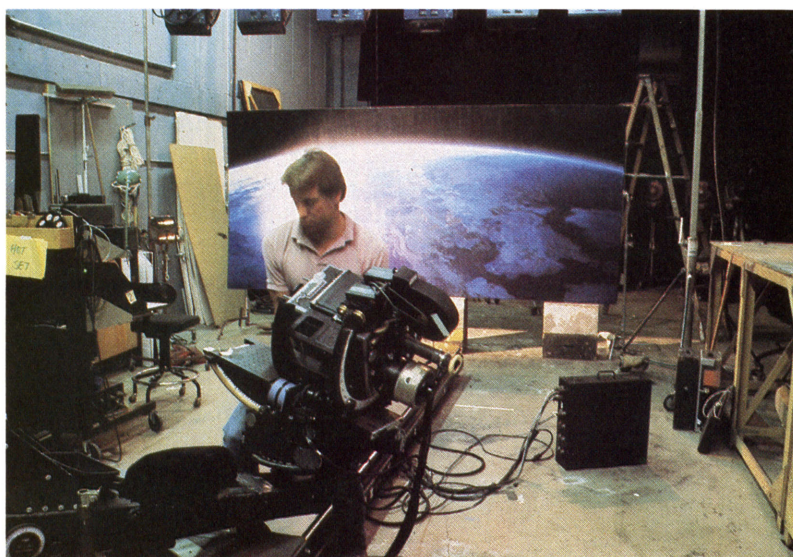
"The aliens were designed mostly as a group effort with Ralph McQuarrie doing most of the design work and Grey Can-

nom giving a lot of input into the 'look' of them," Ralston noted. "You really can't see them in much detail once we got through with them. Greg did all the makeup appliances for the peeling skin scenes. We made all of the alien shots at ILM except for a few scenes that were done in Florida.

"We set up a blue screen shoot here that we did in about two weeks, where we handled all the aliens with all the backgrounds we had shot in Florida. The glow was done in opticals, in a very complicated process. A lot of it started off with us shooting some high speed reflections in oil and water and combinations of odd liquids and things, getting oddball reflections. We shot some fire effects for it, and we also used some from *Jedi* that we had a whole truck load of. We used those textures to give us the material that was coming out of the aliens. And then Dave Berry (optical supervisor) was step-printing these elements to get all the movement that we had. We had all this center movement, 'stuff' coming at you. Dave created loops of this and they were so abstract that you couldn't see a repeat in the cycle, just material coming at you in an endless scene where there's no be-



Steve Gawley and Marty Brennis adjust lighting on model spaceship. Below: Randy Johnson prepares to shoot matte painting.



ginning or end to it. That was put in with the aliens.

"There's a lot of optical work, a horrible amount of it, and Dave had to do the majority of that. It was an aggravating but interesting part of the show because in this case they were creating the elements themselves. Ordinarily, we shoot things on the stage and hand the elements to them. It took forever because it was so hard, and it wasn't just a matter of looking at the printer and doing it, it was necessary to shoot one piece of it and that had to go in and be developed and then come back and be judged, and then had to be shot a slightly different way to get another aspect of the glow, and that was sent in and came back, and so

on. Then maybe on about the sixth step it would be ruined and we'd have to start over. We had to redo them constantly. It was also hard to achieve a consistency with the glows from shot to shot; we finally did it but it was very difficult. You should talk to Dave Berry if you want a really horrendous, detailed explanation of how it was done."

Supervising the *Cocoon* optical effects was a gigantic job for Berry, who worked on the first *Star Wars* epic shortly after graduating from film school. Although he had created optical effects for many Lucasfilm productions, *Cocoon* was his first outing as optical supervisor.

"*Cocoon* was unusual in that we normally don't make our own elements that go into a shot," Berry commented. "In this case we generated some of the elements. We enjoyed that and it was something different, but it put a lot of extra pressure on us.

"After discarding all the tests we had done, we first generated just an edge glow around the persons portraying aliens. This is a common technique which we use frequently for planet glows. We just used the blue screen to generate a glow, and it looked neat, something like the glows in *Tron*, but the producers wanted some steamy, vapory stuff coming off them too.

"So we kept that basic edge glow and then added another element that we call a vapor element, which was made using a combination of a common technique which is done frequently and a couple of twists of our own. Our basic technique was the old idea where you do a multiple pass thing on some kind of action – say, someone walking past, and you print that same piece of film perhaps 20 times. And each time you do a pass you offset the sync by one frame, so that when the subject moves you get this trailing image behind it. Of course, we didn't want it to totally wash out when we did these multiple passes so we used high contrast techniques to minimize that. This gives funny looking edges – sometimes called *ridging* – where you can see all the separate exposures. In this case it was important that the differences between all the separate passes weren't seen, because that would look like a photographic technique.

"Then we added another twist. On each successive pass, in addition to offsetting the sync by one frame, we enlarged the image slightly. Thus, in addition to having this trailing stuff coming off, it also dissipates towards you. The other twist was that we added a lot of diffusion to soften it out, to get the ridges to blend into each other."

Berry explained that the idea grew from a technique used

by a friend of his in film school, Adam Beckett, in quite a different context. "He used it as a technique utilizing simple line animation on paper," Berry recollected. "He'd do multiple passes, with zooms and other moves, so that he'd get a buildup of what would be the equivalent of about 900 passes through the camera and it would transform the animation so that it looked a bit like video feedback. Actually, video feedback is easy to do and it was the first thing I suggested they try, but we never did that. The optical effect we used is a little more involved."

"In addition," Berry noted, "we would take a hi-con window matte – a clear center – and do the 24 passes on it with the zoom and everything. To break up the monotony of that, so that it wouldn't be just a big white blob, we ran a texture inside of that. In this case it was water effects that Ken shot on the stage, miniature rocks and reflections. And then they used an air hose in a little 4 x 4-foot tank and shot a couple of thousand feet of high speed patterns. I went through the roll and selected a bunch of different types of textures and made loops out of them of about 100 frames so I could cycle them over and over again, into infinity."

"We would run that texture inside the window of the alien and then do the zoom on it, so the two things would be working together, and it gave a really weird effect. You could see the outline of the body, you could tell there was a shape in there, and the arm would move and there'd be all that stuff streaming off it, and it would be coming toward you so it had a depth to it. Then we took that and diffused it and ran more texture stuff inside of it and added color to it. That was our finished vapor element, which was then taken in the composite and matted into the shot as an interpositive."

Heavy optical work also was involved in the love scene with Tahnee Welch and Steve Guttenberg in the pool. The aliens make love in a curious manner (by earthly standards): the lovers sit in

water some distance apart and the female partner sends out a force or essence which, after some acrobatic maneuvers, pays a visit to her partner. According to Berry:

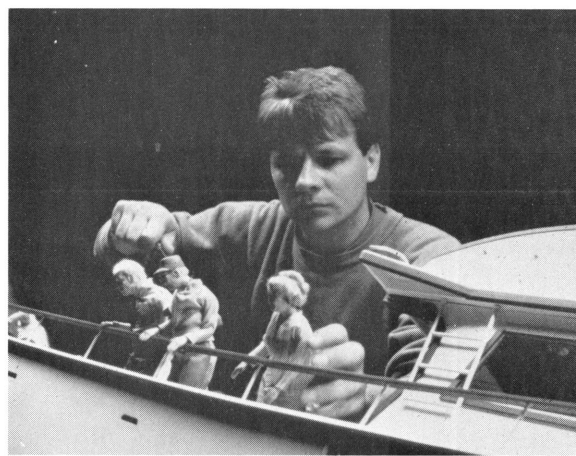
"It started with a lot of animation that Charlie Mullen and his team did and we sweetened it a little in optical and made it match the other alien stuff – it has a rather similar quality to it. In the long shot of the pool, the thing comes out of Tahnee's body and a big round object forms over her head. It's just this weird thing that's moving around up there, that's the only way I can describe it. Actually it's just a bunch of water reflections going up, although you can't really look at it that way because it has about 400 passes on the printer in it. After it had gone through so many things in optical nobody knew what it was – it became a strange, alien essence."

Kenneth Smith, Donald Clark and James Lim were key optical cameramen on *Cocoon*. Optical line-up was the work of Ed Jones, Ralph Gordon and Peg Hunter.

Matte paintings, though utilized sparingly, played an important role in maintaining the distinctive visual style of *Cocoon*. Chris Evans, supervisor of the matte painting departments, and Caroleen Green were the artists. The matte photography was done by Paul Huston. "We only did a few paintings, but they were inserted at crucial points in the film," Evans said.

"At the beginning, with the titles, is the scene of the boy looking out of his window through a telescope," Evans reminded. "The neighborhood he's looking at is a painting, so you're looking at a blue screen window, boy and telescope put over a painting done by Caroleen. It was put on the Automatte with multi-plane clouds, so that the clouds floating in front of the moon would move."

"Then there's a cut to a shot of the moon as seen through the telescope, with the clouds moving in front of it. The moon again was painted by Caroleen and



David Sousa adjusts puppets on board the model *Manta III*.

the scene was done on the Automatte with a mask for the telescope effect. Later on you see that same moon being eclipsed. That again was a matte painting with the shadow from a split exposure crossing over it. And we worked on some of those neighborhood scenes."

The most spectacular matte art is employed for a sequence at the end of the picture in which the alien ship heads into another galaxy.

"Caroleen painted the planets and earth," Evans explained. "Then I worked on the final shot of the nebulae when the camera pans with the space ship as it goes off into the colored galaxy. That was primarily Ken's conception and I painted it on four parallel layers of 8-foot square glass panes. I airbrushed each of the layers with transparent acrylic paint and we backlit the whole things so that it had a luminous, glowing quality. It was all shot on the motion control stage so that the move into the painting is repeated and put into the stars, the space ship and other elements."

"The idea of painting on the four giant panels was to have the layers comprising the galaxy stacked up so there would be a perspective shift when the camera moved in on them, and so the foreground stars and gas clouds would move around the camera."

Charlie Mullen was supervisor of animation for *Cocoon*. He has since been "kicked upstairs." His successor, Bruce Walters, also was heavily involved in



Aliens and earthlings
like are bagged for
their own protection.

the frame-by-frame work that gives the penultimate touch to many of the startling scenes.

"All the aliens wore white suits," Walters recollected. "There was an optical effect to create the glow, but an awful lot of roto work had to be done to isolate things. If the character should reach around a door handle or get behind anything a great amount of animation was needed to separate the characters out.

"There were some Coast Guard boats on the water and the search lights weren't bright enough, so we added the lights back in with the ships. There were a lot of light effects that were animated enhancements, such as the beam of light coming out of the ship in the beginning. There were also some dolphins in the beginning that were floating in the water that were animated. There were 14 of them and each one had its own up and down program. There were shadows, too."

Walters recalled with pleasure that one of the more baffling sequences – the love scene in the pool – was achieved without having to resort to time-consuming animation.

"The things flying around? They were just little dolls covered with glitter," Walters stated. "We flew them around on the animation stand. We top lit the dolls with different colored lights and we flew them around to get all the streaks and things. That's another thing our machine can do: it puts tails on things and

you can fade the lights out so that the tails dissipate before they go away. All the love scenes were done with just one little model, then there was a bit of optical enhancement to give them a residual effect after they went by."

Steve Gawley, head of the model shop, described the miniature work his department did for *Cocoon*:

"Ralph McQuarrie designed the alien ship even before Ron Howard came onto the project. We built the thing from his one illustration. It's about three feet in diameter and has all sorts of incandescent lights in it. Its structure allows it to be held from the top or either side. The top was added later for one shot in which the people are looking up at it. They added a rotation to the model although it was not intended to rotate in the beginning.

"We had one scene in the very beginning of the picture, where you are under water and the camera tilts down and pans and you see the ruins of Atlantis. That was a foreground model. We put the elements together, but Ken actually dressed the thing to match his camera needs. That model came together very quickly. All the columns were made out of plaster and then dropped on the ground. Then we picked them up and put the pieces in. We next built some temples out of pine and balsa wood. Then they smoked the set. Ken also had a rig right above the foreground to create the illusion of light in the water. He used jigsaw puzzle pieces and dumped them on a piece of plexiglass above and ahead of the camera. Then he moved the plexiglass to simulate the water surface texture in the light."

Ralston was especially impressed with the miniatures created for the climactic sequence in which the boat, loaded with aliens and earthlings, rises into the air to enter the alien spacecraft.

"The boat was built in two scales," Ralston explained. "One was about a foot long and was used only in a couple of the

very distant shots of the boat being pulled out of the water. The other two were about six feet long. One had all the detail of the boat with all the characters aboard and it was built for making the stop-motion shots. Then just the hull of the boat was built for that one shot from under the water where you see it getting lifted out. We shot that in a pool here in Marin County, with a miniature life raft in the water next to it. The big boat is a beautiful job with all those characters on it. We didn't do all of them with articulated armatures because it was such a mass of people. They mostly had aluminum wire armatures, but there were a few with full armatures. One was the Brian Dennehy character, which was on the very front of the boat, and I animated him because he was sort of apart from everyone else, so your eye would sort of separate from the others and go to that part of the boat where he was. He had on a yellow raincoat and I had him folding his arms and putting his hands in his pockets. I was very happy with the way that turned out, since I don't try to do stop-motion any more. I did a lot of that when I was doing commercials – the Doughboys and a lot of others – and I did the stop-motion on a lot of *Dragonslayer*. There's a lot of it here, but I try not to do it much because that was a hard, hard movie."

Gawley said that David Sosalla, stop-motion supervisor, built the little people, who were cast in foam and intricately detailed. "They were about one inch to the foot. The large boat is mounted from both sides, the stern and underneath. Initially, it was only going to be used in a few shots, then they expanded it to more. The little people in the smaller boat were from a Lionel train set and we performed leg operations to make them the right size."

Ralston enumerated several unusual scenes produced for *Cocoon*. "We also did some blue screen work at ILM with Tahnee Welch on the boat where it is

being pulled up, and a few other odds and ends. Shooting the blue screen stuff was pretty traditional. In fact, it was easy because the suits were white. There wasn't any trouble with lighting or shadows because we had it flat lit, inasmuch as they weren't supposed to have any real definition except that we had to fake some of it a little bit to get the shape in there. And we did some insert shots, like one of the husks falling (the male husk with the beard), the alien head turning when it dies, things like that."

One experiment in blue screen technique proved successful and Ralston believes it will be important in future work. "It was something I wanted to try on some of the aliens for floating shots," he revealed. "I shot an alien static against the blue screen and then took that element and projected it up onto a card. We went through seemingly endless tests trying to duplicate the blue screen again with our filters in the projector, because once something goes

through the blue screen it is a very specific wave length of light, and if you take that piece of film and run it through the projector, which has an incandescent bulb, everything is different - it changes all the qualities of it drastically. So, we had to go through a lot of filter tests, but we achieved something that worked really well.

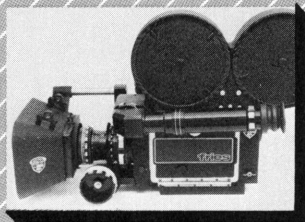
"We didn't know *how* well until we got to the shots of Tahnee on the boat when the whole thing is moving away and we see the figures waving and all that. That's the thing that really told us how well we'd locked it in because the white figures against the blue screen could have been way off, could even have been black, and we still could have pulled a matte off of it. A white figure is great; you couldn't ask for anything more if you're trying to get a matte. But the figures of Tahnee and some of the older folks as the boat lifts off were shot with blue screen, too, and we projected them up with the miniature

boat - all the little hair and everything - and it worked out fine.

"That particular shot of Tahnee was a real landmark for us. There's a lot going on in it, and it's one of the few times here where the people viewing dailies cheered and and got excited about it. And it was the first time through optical but it all came together. Most of the matte lines were gone. It was one of those shots everyone fears in optical, that they don't want to do because they know they're going to have to do it a hundred times, but we tried it once and it worked. I wanted to get a few more subtleties in it, but it never turned out as well as the first take. There were a few problems in it that no one in the audience can see, but I could see them. I figured it was such a great shot that we should keep working on it, but it was too hard to get. There'd be a little matte line on one side of someone's face. Finally it became a matter of, 'Well, let's forget it. Time has run out as usual.' "

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BACK TO THE FUTURE on Wheels of Fire

by George Turner

Years ago a youthful Ken Ralston gained an enormous reputation as a photographer of space ships hurtling through "a galaxy far, far away" in George Lucas' *Star Wars* saga. Today he is one of the five visual effects supervisors at Industrial Light and Magic who oversee a small army of technicians and artists whose collective skills make the most imaginative fiction possible on the screen.

One of Ralston's recent films is *Back to the Future*, which proved to be the major boxoffice attraction of the past summer. The Universal release, which was directed by Robert Zemeckis from an original script by Zemeckis and producer Bob Gale, is the sort of show that could have been an ab-

surdity had it been produced less skillfully.

The story concerns a likable young man, Michael J. Fox, who becomes involved in the experiments of an eccentric scientist, Christopher Lloyd. Lloyd's invention, a plutonium-powered time machine designed as a DeLorean auto, takes Fox back to 1955, where he meets his parents *before* they were married. The future mother and father are incompatible, which means Fox must bring them together or he will have no future to return to. Complications: the mother prefers Fox to his future father and the DeLorean's power supply is exhausted. But it all comes right at the end.

About a month after he had begun work on *Cocoon*, Ralston saw the script of *Back to the Future* and agreed to supervise it as well.

"I took the project initially because there were a lot of pyrotechnics in it," Ralston explained. "In the first draft of the script, to get back to the future Marty had to go through one of the first A-bomb testing sites and drive into an A-bomb that's dropped on him. That really intrigued me because we were going to have to duplicate all the old footage you've seen where the blast rips those buildings and houses out of the ground. I thought, great! We need some work in here for the pyrotechnic

guys and it'll be perfect. I can get a crew and I can high-speed that stuff and will hardly have to think about it.

"And, as usual, as soon as I was on the show it changed dramatically. It was better for the show: a lot more intimate and you can have a lot more fun with the character of Chris up on the clock tower than getting him involved in an atomic explosion. And it was far better for the producers, because their budget wouldn't allow what we wanted to do and they couldn't build the sets in the desert with what they had. So they changed the whole concept and rewrote the ending and it turned out to be a much more suspenseful and fun kind of show.

"The thing that's deceiving about *Back to the Future* is that the effects work blends so well with what's happening that people aren't even thinking 'effects,' no matter how outrageous they are," Ralston pointed out. "There are actually about 30 effects shots in it. There are a lot of things going on in them, but the feeling we wanted to get and that the director, Bob Zemeckis, asked for was a really violent and incredibly bold look to everything.

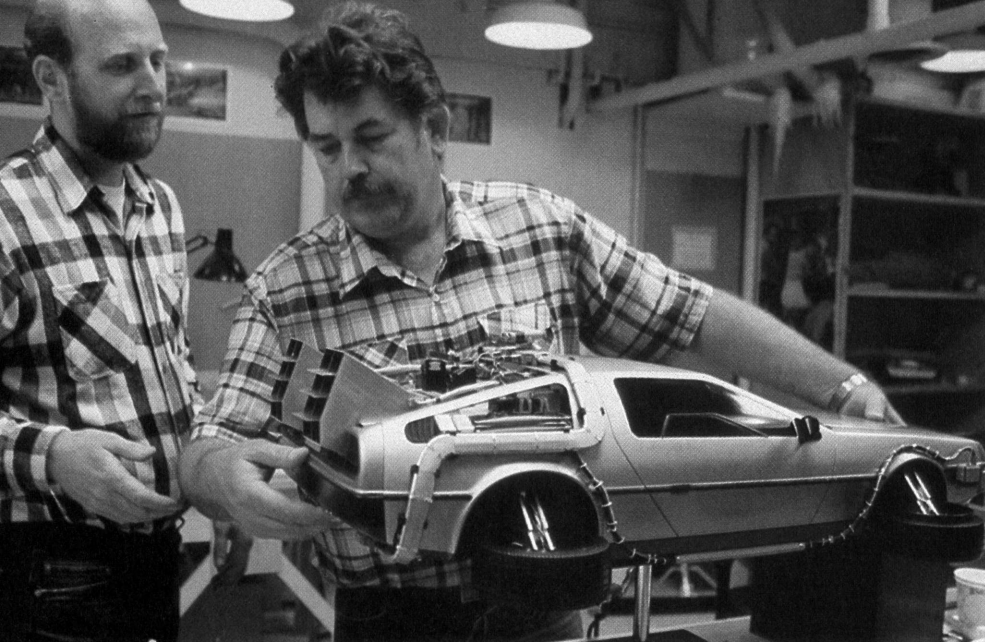
"It was one of the harder shows to do. They had written it, apparently, to be shot on warm summer nights in L.A. Actually, we had to shoot it in winter and it was raining and freezing all night. My problem was that I was doing two shows at once. There was a span of about three weeks when the worst happened: I was still in L.A. doing *Back to the Future* at night but I still had to be involved with *Cocoon* during the day. I was up for 24 hours many times, and it burned me out for a while. I almost went too far, but luckily it sort of scheduled itself out – but it came close!" He winced at the memory, but added: "It *was* a good education, to be on two totally different productions and see how two totally different groups handle films."

Ralston doesn't agree with the idea someone expressed that visual effects techniques be-



Final composite of the DeLorean's test run. Below: Lloyd and Fox positioned in front of blue screen with a mirrored plex floor. Opposite page: Lloyd and Fox with the full scale DeLorean time machine.

Photos by Kerry Nordquist/JLM



Gawley and Ira Keeler with the model DeLorean. Below: Grip Peter Stoltz prepares model for shooting.



come routine with experience.

"This work never gets easy," he stated flatly. "I always try to con myself when I see a shot that seems simple, and that shot always turns out to be the worst one I have to do. No matter how much we do this work it's always like we were doing it for the first time. There are so many variables – one little thing goes wrong and you're screwed. Everyone here has that problem. I certainly don't plan to do two shows at once again. But I was lucky, I guess, to end up working on the two big films of the summer. In this field you always hope the effects you're doing will be utilized well by the people who take your work. If it works when they put

the sound and music to it, *great!* It makes you feel really good."

Only one scene in the picture disappointed Ralston. "It's the shot where Marty puts his hand up to his face and a hole starts to form in his hand. That was cursed from the beginning and nothing worked out for it. Bob directed it up here. Just for protection I shot a blue screen of Michael just standing there and not doing anything with his hand, and then I shot a blue screen of the hand alone – because I wasn't sure which direction we were going to go for the effect. When we put it together, they got the black and white composite and they thought we had shot the hand out of scale, which wasn't true.

We just don't do things like that! The problem was the lens they had picked, a wide angle – his hand was monstrous. What we finally did was to make the hand about one third the size of a normal hand. Something is weird about it, but they felt that it worked better, but it never did work for me. It's the weakest shot in the show, but it doesn't stand out badly, and at that point in the film the movement will carry you through – and audiences, I guess, are liking it."

Blue screen compositing is utilized so often at ILM that it has been expanded into some unusual areas. "There's the shot of the professor and Marty standing on the parking lot and you see their distorted reflections on the wet pavement," Ralston pointed out, "– that doesn't look like blue screen, but it is. And that's blue screen where the fire goes between their feet and there are all sorts of roto effects going on." He was especially pleased with the scene in which the automobile materializes. "The professor is talking and suddenly he grabs Marty and starts to spin him out of the way of the camera. We pan off the background and them, and that's all blue screen – the actors were blue screened separately from the background. We pan off as the car is forming and skids into the shot and spins around, then it's frozen as it comes back into the present. That was certainly one of the better blue screen things."

Blue screen work at ILM is done with Eastman 5247 film even when first unit photography utilizes 5294. "We've used 94 on the backgrounds, but we can't use it on the blue screen" Ralston said. "We've done some tests here on it and it just doesn't work. There's no real reason in most cases to use anything but 47 on blue screen, because you're in a controlled environment. Yet, I would like to see 94 become finer grained because the majority of the DPs out there are using 94, which they can light easier and it makes their lives easier and makes *my* life miserable, because I have to go with their same lighting or

insist that they beef up all their light for a particular set. All the stuff in *Back to the Future* and a lot of the stuff in *Cocoon* was 94, but because of the effects action that's happening in those shots – and the audience is watching that – we can get away with it. We are so attuned to that stuff we pick up on every flaw, we can't escape it. It really depends on the action of the scene, what you can get away with, and you try to get away with as much as possible.

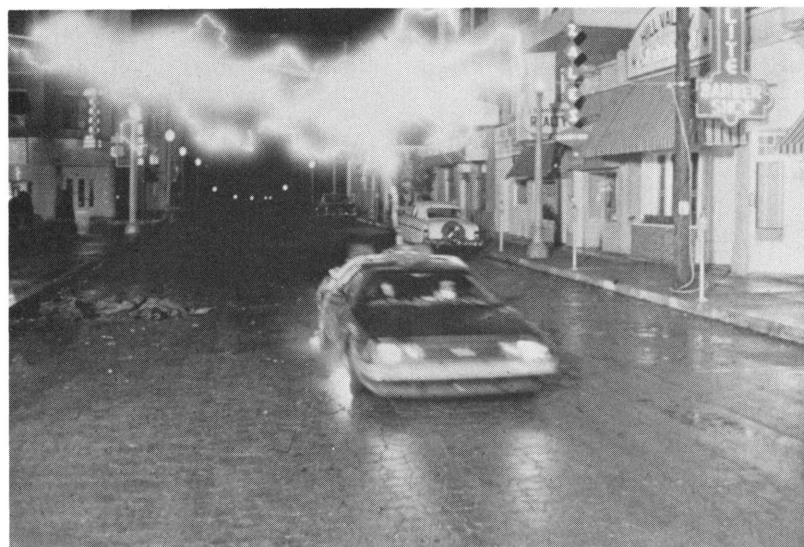
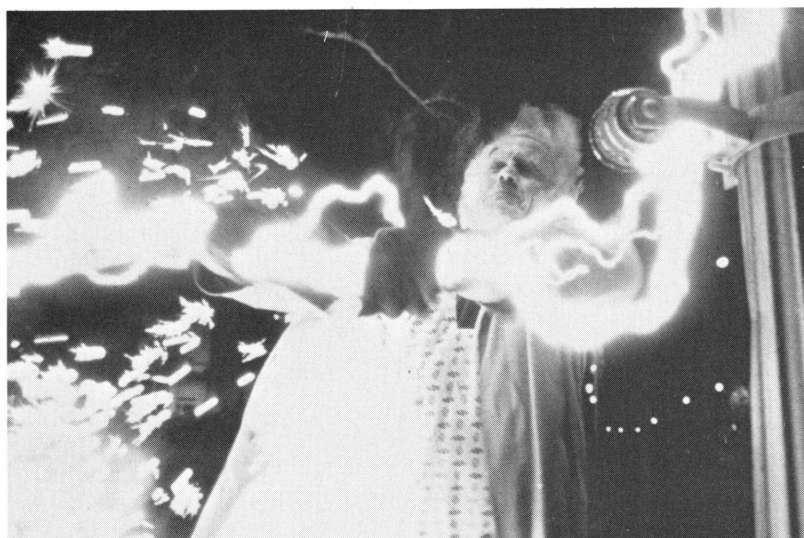
The most memorable effects scene is near the end of the picture, when the professor's auto/time machine flies down the street, above the pavement but beneath the branches of the trees that line the street, turns around several hundred yards away and heads back towards the camera.

"That flying car was built by Steve Gawley, head of the model department, with Ira Keeler and Mike Fullmer and just about everybody else Steve had available," Ralston said.

Gawley described the miniature car:

"Our miniature of the DeLorean time machine only appeared in the shot at the end of the film. It was a neat vehicle, and maybe if they make a sequel you will get to see more of it. It does exactly what the big one did – and it flies. That project involved five men and we took a few months to build the thing.

"The wheels light up to simulate rocket thrust. They actually extend from the body and fold down on cue. All the neon lights on the body are functional. The two big thrusters on the back are functional – they are projector bulbs. The tail lights are functional. It was a fun project for us because it was something people could relate to. It is a car. That is kind of new to us; it is our first car. We actually have a gal next door in our accounting division that owned a DeLorean. While they were building the life size car in Los Angeles, we borrowed her car and got the basic shape of it from photographs. Then we started the body shape itself. We knew it had



*Animated lightning added to live action.
Center: An animated and electrified Lloyd.
Below: The time machine connects.*



Ralston sets up Fox for insert of guitar neck.

wheels and tires and it was stainless steel. We got detailed pictures of the real one later; I figured the specs for what we needed. We got some side shots and rear shots and we detailed it from the photographs."

Gawley revealed some details of how the car was constructed:

"It was built in one-fifth scale. It is about 33 inches long. It is an epoxy lay-up rather than fiberglass, because we wanted it stronger and thinner than you can get with fiberglass. It can be held or mounted from five axes. Actually, the 'stainless steel' finish is just paint that we rubbed with steel wool to give it that texture. The tires are actually not rubber, they're aluminum. That is because we used halogen lights in each wheel to simulate rocket thrust and they generate a tremendous amount of heat, and we could leave the tire lights on for about an hour before we had to turn them off.

"Ken felt that the interior was not going to be seen, so the car had no puppets in it. We put a little coating of blue chalk on the windows to simulate the reflections of a blue sky. When the shot was first designed, it was supposed to go up and hover, almost like a helicopter take off. Then things got changed around..."

After the work of the modelmakers was done, it was up to Ralston to put the flying car on film. He told us how he did it:

"I did one day of testing and I personally programmed the

whole thing and shot it in one other day – it took just two days to do. We had to do it because we were way out of time on that show, and then right at the worst part of it they cut about two weeks out of our schedule because they moved up the release date. They handed out thousands of those buttons – "On July 19 we're going BACK TO THE FUTURE" – but it was really July 3! So we killed ourselves for a few days getting the thing shot.

"It's motion controlled and fairly conventional as far as the shooting is concerned, although we had a lot of lighting things to do on it and passes with the rockets that come out for an instant. That was shot in a smoke environment, where the wheels formed the cylinders of light. And there were backup lights and the lights that came out of those – I don't know what they are – those retro-looking square things. We had neon lights that worked on it. Everything matched the full scale car as closely as we could do it.

"Shooting it in motion control was difficult because it did a complete turnaround and came back, and we had to mount it in such a way that it didn't interfere with people seeing the car. I was debating on shooting in two different mounting and lighting situations, but that just complicated it too much. It would have destroyed the continuity of it, I think, to lose that turnaround, going behind the tree and flying back.

"It had to go all the way down the track with all the memory units we had; I was stretching it as much as I could. Then it comes back and almost hits the camera and goes into time at the very end.

"The plate was shot at Arleta, California, on a very windy day after a storm had just cleared in L.A. Luckily for us, the sky was so bright that we could pull mattes off the background tree that it goes behind. When it comes back, that was pulled off an actual element, but when it goes into the distance that was an articulate

matte created by Barbara Brennan in the animation department. When it goes under the tree, that was our matte, and when it comes out from behind the tree that's also our matte, but it was created a different way. We also pulled a matte off the foreground leaves, which were pretty dark against a light sky, because there are moments when the car is behind those as it comes towards you. There are a lot of animation effects just at the very end when the thing starts going back in time and – boom! – there's a whiteout. Jack Mongovian animated shadows on the ground, which are very well done.

"At the last moment Bob Zameckis thought it would be funny to put a little turn signal on the car when it goes back and does the turnaround. I don't know if anyone sees it, but it's there – a little tiny thing blinking on and off. It was done in animation because we didn't have that when the scene was shot.

"When the car first takes off we show some liquid nitrogen vapor at high speed blowing off and we put that over the scene just for an instant, so that it gives the effect of a lot of debris coming off the road, and got rid of it quick when the car blasts away, to give the impression it blew it away. It was a difficult shot to program, getting it to match the perspective and what was going on in the street."

As is usually the case when elaborate effects are being produced, time was the great enemy. "I can't tell you how close to the wire we were on that shot," Ralston explained. "They were standing by at the lab to grab it and print it. The one thing that isn't in the shot, although no one notices it, is that there are no shadows *on the car* when it goes through all the shadows of the trees. Because at first, you're looking at the back of the car and there's so much going on. But when it comes out, there are a few moments where I wanted to have some shadows. We had all the materials to do it, but we didn't have

the time. If we'd had two more days we could have done it, but it doesn't really matter because no one sees the difference. What Bob wanted was to keep the gag always ahead of the audience, so you see it, but by the time you get it it's practically over."

Another short but extremely difficult shot is a side view of the auto going into time. "Although it's very quick – something over 200 frames – there was a lot of grief over that shot," Ralston recalled. "It was murder, merely trying to come up with the *look* of it. Just the concept of the car went around and around so many times that it delayed us in getting the shot. All of our meetings seemed to center around that particular effect and we were going all directions. On a Spielberg show there are so many great minds at these meetings that ideas are going everywhere and it takes a while to narrow them down to something that you can do."

Ralston described the desired scene: "A side shot with the camera trucking along with the car and then all the effects start up and it shoots the thing forward, things come out of it and it goes into a big whiteout." It was hoped that the scene could be accomplished with pyrotechnics and physical effects on a stage. "We tried; it didn't work," he recalled. "We tried all kinds of different things for that." At last the added effects were animated into the scene. "I think the animators did a great job on it. It really looks pyrotechnic in quality; it doesn't look animated. It looks like physical things that we could never have shot."

Bruce Walters, animation supervisor, said that "The lighting and electrical effects were standard animation, drawn in ink on paper and we let opticals add in the glows." In this process, high contrast mattes are made of the artwork, and the glowing effects are created through diffusion in the optical printer. "The thing we called a 'time slice' – where the car goes through the time warp – was the same idea, basically. It required a lot of overlapping art

work because there was a lot going on – ricocheting comets and glows and action.

"One tricky thing were the shots of the snapshot in the neck of the guitar, with the people in the photo gradually disappearing one at a time. Steve Gawley built a larger than life model of the guitar head that was about a foot long and six inches wide. We had photographs made that were about 8"x10". In the photo are three characters standing in front of a well. To make them disappear we tried two techniques. In one version we had four different pictures. The first had the well only, the second had one person in it, the third had two people and the fourth had all three characters. We tried to dissolve between each one.

"The other technique was to use one picture of the well and cut the characters out from the other pictures and stick them on one at a time. Then we did dissolves to make them appear and disappear. The photograph was stuck on the guitar neck so it wouldn't move and the guitar neck was moved around so it looked like somebody was playing it. Once we got the move in there we could trick around with the picture and it would always match, even if we did dissolves on multiple passes."

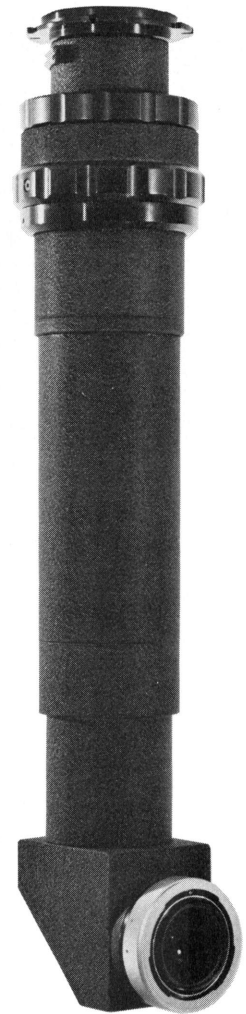
Ken Ralston mentioned one important aspect of creating visual effects for outside clients:

"We try to set things up so we're not wasting everybody's time, because that can happen easily. Schedules are tight because it costs so much to make films now that if you waste two minutes you have people breathing down your neck and that only makes things worse." He added:

"It's a fascinating, ridiculous way to make a living. It's amazing that anyone can do it and survive. While you're doing it it's just killing you and you're complaining, but you just keep going and you want to try it again and again. You know, our particular niche is the most bizarre aspect of films." △

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Into the Stratosphere With

EXPLORERS

by Nora Lee

How often has the story of "the one that got away" been told? Add one more verse. *Explorers* should have been the big fish in the school of summer films, but it floundered. However, it was undeniably a special effects tour de force.

Industrial Light and Magic produced around 150 shots for the film (exceeding *Star Trek III*) and every department contributed. There were the usual models, miniatures and motion control shots along with some special animation, computer graphics and a

new rig for flying people. Although only one of five films ILM contributed to last summer, it was the most ambitious.

Explorers is a story about three young earthlings who are contacted by some adolescent aliens in their dreams. The dreams reveal important information that enables the boys to construct an energy sphere. The sphere protects their homemade spaceship, the Thunder Road, as they travel through space bringing greetings from the Earth. *Explorers* was di-

rected by Joe Dante and John Hora, ASC, was the director of photography (see *American Cinematographer*, August, 1985).

The first obvious problem and, therefore, one of the last to be considered is the energy sphere. The sphere or bubble, is in about 50-60% of the effects shots and according to Bruce Walters, the animation supervisor, "it was a detail that was sort of overlooked." Originally, it appeared that Don Dow, director of visual effects photography, would have to solve

the problem, but Walters thought that trying to match the moves of the bubble to the action on the plates would be difficult, if not impossible, for the motion control system. He had another idea.

Walters knew that an eight inch diameter plexiglass ball was already being tested. It had been covered in paint sensitive to ultra-violet light for some motion control tests. His idea was to use a picture of the ball and manipulate it on the Oxberry stand rather than shoot it on stage. "They lit it and made some 4 x 5 transparencies for us. We made different scales, from a one inch diameter transparency all the way up to a three inch diameter transparency. Then all we had to do was re-photograph those on the animation stand, building in the appropriate action," said Walters.

Walters makes the process sound disarmingly simple. In fact the transparencies were only part one of a three and sometimes four part shot. The basic outline of the bubble was defined by the transparency, but it did not look spherical on film. Another piece of art work was generated to put reflections in the bubble and finally, the clincher. The animation department discovered the trick to making their bubble look spherical was to distort whatever was seen through the bubble. Walters recalled, "We made a circular matte that was the same size as the ball so that we could do the distortion effect. The distortion effect was the key element. The inside scene is reduced just slightly from the outside scene and amazingly, your eye automatically picks that up. Your brain makes an edge around it - a real strong illusion - but it didn't quite give the illusion that there was any ball there. So when we DXed (double exposed) the photograph of the ball on top of the distortion effect it added to the illusion that the ball was round. Finally, we DXed the highlights on top of that. So there were three elements altogether - that's what popped it out and made it look round."

The basic problem of *how to do it* was solved. All that remained was *when?* One of the most complex sequences involving the sphere takes place in the basement of Wolfgang Muller's house. This is the first time the sphere is seen. For this shot it stays fairly small, but it runs amok and totally destroys the basement. Effects supervisor Bruce Nicholson remembers the detailed set-up that was necessary to choreograph a bubble that no one on the stage could see. "Joe had an idea of how he wanted the bubble to move around the basement. The basement was a wonderful set that Bob Boyle, the production designer, had designed and there were all kinds of props lying around there, including a croquet ball. We painted it white and gave it to Joe. We then photographed him walking around the room showing us where he wanted it to go. Now it hits the steam pipe, or the bed frame or goes through the refrigerator. Of course, the action was a lot faster, but it gave us a basic point of reference. All the physical effects were planned out so that at a certain point the steam pipe blew, the bed frame fell, or the fuse box got hit. The sequence of events accommodated the speed of the bubble.

"We averaged about two to four takes for the physical effects. For some there was more. When the cat jumps up and runs away - we probably did about 15 takes of that. We had an animal trainer hiding behind the couch and he would just throw him up in the air. The cat had to land at the right point and take off the right way so we just kept shooting till we got it right," said Nicholson.

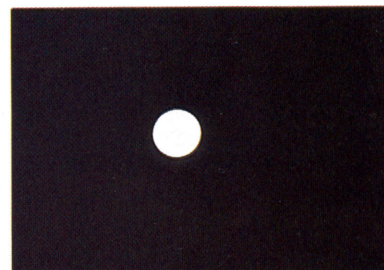
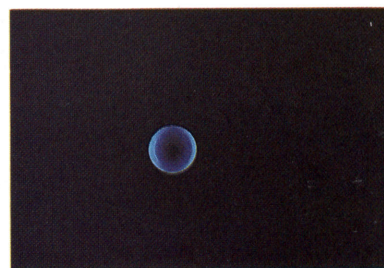
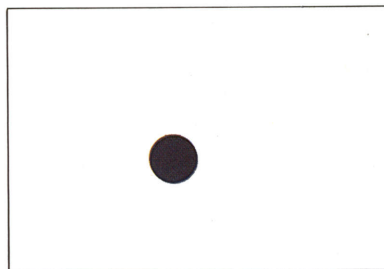
The bubble was inserted into the plate by matching the predetermined moves. Walters explains, "Our camera is a rotoscope camera as well as an animation camera, so we can project down existing footage. We project onto the animation stand and mark positions in the frame. Then we move our animation stand around until our artwork or our model



Opposite—Final composite of a scene with the animated bubble.



Mattes and elements that combine for final shot. 1. IP plate. 2. Reduced IP plate for distortion in bubble. 3. Bubble hold-out matte. 4. (Not pictured—Crescent highlights on bubble.) 5. Blue bubble art work. 6. Background reduction cover matte.





Craig Barron shoots urban matte painting. Center: Composite of clouds and circuit board for third dream sequence. Below: Paul Huston adjusts lighting on circuit board model.



Photos by Kerry Nordquist/ILM

matches the move on the frame. We can sample that position on our computer. Then we can advance to another position – the next frame or a hundred frames down the road – and continue doing that until we have the whole move sampled and our computer will fill in the blanks. Then we run through the move to see if everything is matching. We have a real-time preview mode. If it is matching, then we set everything up to shoot. If it doesn't match, we go in and tweak the program a little bit until we get it right."

Walters heads the half of the animation department that is most technical. They are rarely involved in the more traditional types of animation or rotoscoping. Instead they believe in making the camera do as much of the work as possible with as little art as possible. Walters prefers a camera rig that can be torn down and rebuilt to suit immediate needs. Often he is involved in building special rigs for moving particular pieces of art. For *Explorers* he built a tiny rotating light box. The special mechanism allowed him to rotate the transparency so that the lights in the bubble appeared to follow the source light as it moved through frame. So, although the bubble began as a difficult problem, everyone concerned considered the solution to be elegantly simple. Some sequences were just the opposite.

The opening shots of the film are part of Ben Crandall's dream that show the critical circuit board for making the energy sphere. There are three dream sequences and all of them had their own special optical problems. The opening dream was computer generated by a new company called Omnibus Computer Graphics. According to Nicholson, however, what appears as a simple graphic was actually a complex optical composite.

"The computer graphics that were done for the first dream were actually hi-con black and white elements that were composited together. Omnibus shot

one black and white element for each color. The first one was mostly vector graphics and because we had really small, well defined vectors, we found it necessary to shoot in black and white rather than color to minimize the problems of resolution and aliasing. Omnibus did shoot in Vista-Vision and then we would filter each element and matte them over each other where necessary," Nicholson said. "It ended up being a fairly complicated composite to do because there were so many colors and mattes."

The second dream sequence was mostly color elements generated by the computer and filmed off the CRT. The third sequence had no computer graphics at all and yet it matched the first sequences well. The challenge of the last dream was that it was supposed to be a collective dream – all the kids were having it and they were all flying through it. The sequence had four kids flying through clouds and over a circuit board. Don Dow describes the new approach he and his crew took on the old subject of making somebody fly:

"When we first looked at the storyboards we thought that maybe we could do half the shots live action and the other half with puppets. We actually built puppets of each of the kids and we never used them for that sequence.

"We decided to approach it from the standpoint of a motion control shot. We developed this new rig so that we could use live actors for the flying stuff. We found a way to mount the actors so they would be comfortable. Then we did our camera moves just as if we were doing motion control – the camera does the moves instead of the model – or in this case the actor. We had a real good team of people working together on it and it worked."

Some of the help Dow got was from the model shop. Model supervisor Ease Oweyung and crew took on an interesting assignment. "We had to build flying suits for the kids. We did a

body cast and we did a fiberglass and graphite body suit that went from the hip to the chest area. These suits had supports in them so the kids could be mounted for the flying sequences."

An actor mount fashioned after a model mount with a special pylon that melted into the blue screen was used to hold each of the kids. This approach gave Dow a little more flexibility than the normal harness and wire method of flying. Dow continued, "We were limited somewhat in the moves, because we had only three axes to work on. If we changed the mount we could get a fourth axis, but we couldn't get all four together. There was a point where we needed to roll the actor as well as making him yaw and maybe pitch a little. If we changed the mount we could get the pitch, but we couldn't get the roll.

"The rig, itself, worked flawlessly. We didn't have any accidents. We never had a breakdown of any kind. It was a very simple rig. I think we could go back now and make some changes and make it a little more complicated to do other things. I'd like to try and improve it."

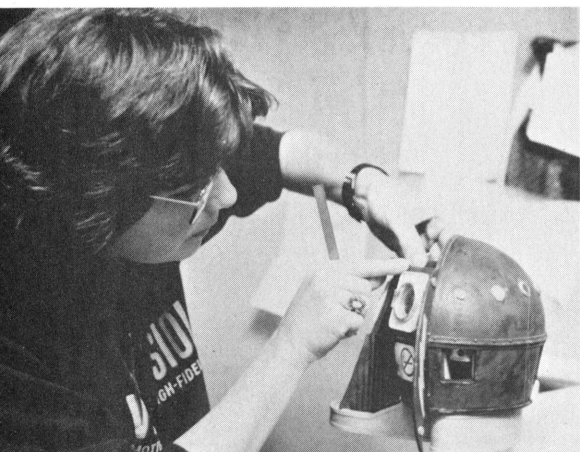
Since there was only one rig that could handle the body suits, each of the four children had to be photographed individually. The continuity and choreography was critical. Dow explained, "I



Don Dow adjusts fiberfill clouds for dream sequence element. Below: Bruce Walters and Mike McKenzie work on animation stand fitted with rotator.

ended up running the camera on those shots because I felt that with my motion control experience I knew what to look for in a move. It was difficult for me to direct because I was behind the camera. I couldn't be out watching everybody else. So we went through and rehearsed everything and found marks that everybody should be on at a certain point. Then we keyed that into the move of the Chapman crane that we used. We used the Olympian and it was great. It had the speed and the versatility that we needed.

"With the crane we were able to boom up and look down on our actors. For some of the



Barbara Affonso, modelmaker, works on small version of Thunder Road.

moves we didn't use our fancy blue screen pylon mount. Anytime we had to have two of the kids together reacting, holding hands or whatever, we put them on the belly board because we only had one pylon mount."

In the final analysis, however, an actor is not exactly like a model airplane. "We shot all of the blue screen with the live actors at 24 fps," Dow said. "That was the tough part. With normal motion control we could shoot it as slow as one frame a second. The problem then was, as we choreographed each kid, we had to try and remember where they were in the shot and we had to get them to react to the next element."

Explorers has one sequence of shots where a helicopter, supposedly piloted by Dick Miller, spots the Thunder Road hovering over the city and goes to investigate. The entire shot is a special effect. There is not one single live action element in it. "That was a very ambitious shot," explained Nicholson. "It was a miniature helicopter and the larger of the miniature Thunder Road models with the kid puppets inside. We used a background miniature set with a painted backdrop. There was also the animation element – the bubble around the ship. It was tricky to get the light from the helicopter to shine on the ship properly as it circles around because there are two separate elements. The camera crew actually had to shoot a light pass

of the light hitting the surface of the ship so that it would reflect properly. The whole shot was totally artificial, but we thought we achieved a fairly realistic look."

From Dow's point of view, the only way to sell the shot was to make it look as realistic as possible, right down to a flare in the lens. "There were a lot of elements in that shot. There was a pass for the helicopter and separate pass for the blades. We had to figure the rotation in a normal helicopter photographed with a movie camera. The blades move about three quarters of a revolution per frame. We scaled our move on the miniature to match the real ones. That is what gives it the blur."

"We had to do a special pass for what we called the light shards from the spotlight as the helicopter went around behind Thunder Road. We actually did two passes – one to pick up a lens flare and one to pick up the shards themselves. We added a lens flare in purposefully because we thought it gave it a realistic touch. There was a beauty pass for the Thunder Road and a light pass. Then we had two passes for the background – one for beauty and a light pass for it because there were lights in the city. There were eight or nine elements in that shot. We had control of the whole thing. Our goal was to try and make it realistic. If you look really close you can't see any pilot in the helicopter, but that's the only thing that might give it away."

Bruce Walters in animation recalls, "We did the highlights on the outside of the ball, but there is no ball in this shot because it is dark. We just match-moved the highlights. What we had to do first was match-move the hover and the move of the Thunder Road on the screen, then we animated the highlights to follow the helicopter. Those are the crescent shaped highlights that are on the outside of the Thunder Road."

"Then there are two little dot highlights that work on the Z axis. They not only go around on

the surface, they also come towards and away from the camera. We animated those by hooking up little teeny flashlight bulbs on the end of a stick. I put that on my rotator so that it would follow the same move as the highlights on the Thunder Road, but I also added a move that pointed it more at the camera or farther away. Those two lights described a surface that came out in three dimensions, so that when you see it it has more of a rounded look. The whole bubble is really only described by the highlights, but your mind completes it."

Don Dow estimates that 60% of the special effects shots in *Explorers* had some kind of model in them. Yet, Owyneung says that there were only two models of the Thunder Road, two alien spaceship models, the helicopter and a few landscape-type models. One of the Thunder Roads was quite small, only nine inches tall, and it was built for distance shots. It was constructed by Barbara Affonso. (Barbara is one of the few female modelmakers who has had the opportunity to get involved in the design and construction of spaceships. Probably the only other woman in Affonso's class is Sue Turner who built the spaceship for *The Thing*.) The other model of Thunder Road was much larger, 28 to 30 inches high and it was constructed by Larry Tan and outfitted with puppets by David Sousala so that it could be used for close-ups. Tan was also responsible for the helicopter model.

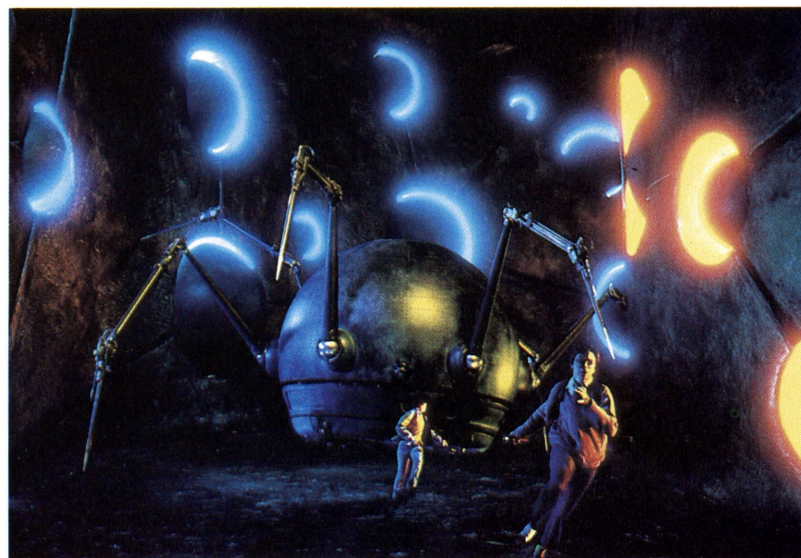
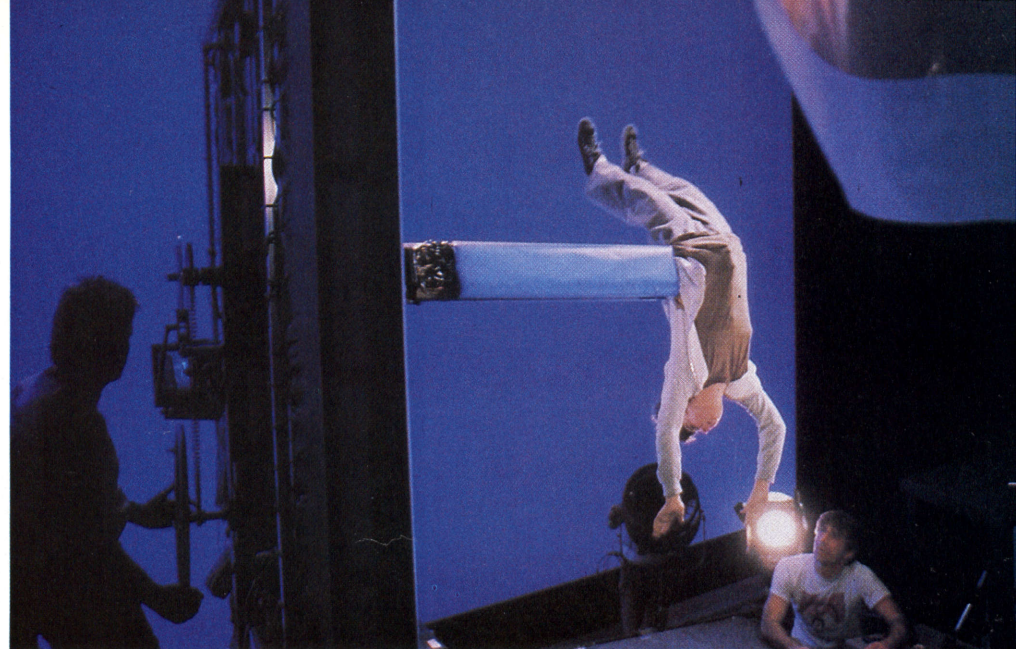
The other models were alien spacecraft. These models, designed by Nilo Rodas, had an organic look to them. Bill George built the smaller one from a sketch by Rodas in approximately two weeks. The larger one was constructed by Owyneung and crew. ILM has a slightly different attitude toward model makers than most effects studios. Most of the ILM crew work from three-quarter view sketches. A lot of interpretation is not only allowed, but encouraged. Most studios still ex-

pect their model makers to work from blueprints drawn in the art department under the supervision of the production designer. The mutual admiration society that exists between the model department and the art department at ILM has paid off for the company in the long run. A lot of time is saved and the models are some of the best in the industry.

Another important relationship exists between the matte department and the optical department. *Explorers* showcased the talents of both in some spectacular shots. According to cameraman Craig Barron, the matte department has revived an old technique recently that has improved the quality of the matte shots in all the ILM projects. As often as is possible and practical, the team is using latent image matting techniques. Instead of developing the plate that a painting must be matted into, they hold that film and develop only a small bit of it. The matte paintings are prepared in the same manner, but when it comes time to shoot, the matte painting image is laid right onto the original negative. The process eliminates opticals and both images are first generation.

Almost all matte paintings in *Explorers* were latent image. According to matte artist and matte painting supervisor Michael Pangrazio, two of them at least, included a third element. The Thunder Road was bluescreened into the shot with a live action backyard with dogs barking and a matte painting of suburbia. The little spaceship flies low over the barking dogs and then in a second shot shoots off towards the drive-in. The drive-in sequence was Joe Dante's own personal poke at special effects in his movies and millions of others.

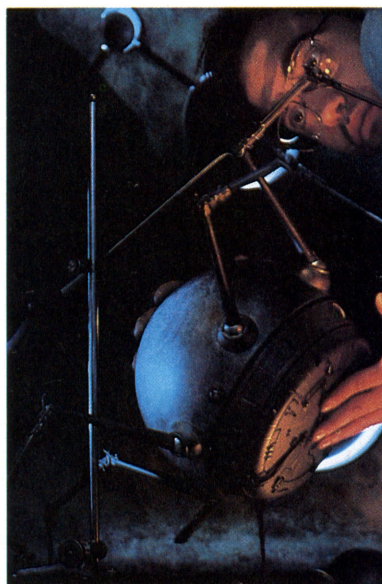
The film on the screen was the movie *Starkiller* made by the L.A. Effects Co. specifically for *Explorers*. The original idea was to use footage from some classic B sci-fi film, but it turned out to be cheaper to just shoot their own version. This sequence was made



Motion controlled flying suit. Center: Composite includes blue screen element of boys running down a non-existent hall. Below: Tony Laudati positions stop motion spider.

up of several other elements. There was the live action element of the drive-in itself, with a latent image matte painting around the drive-in replacing the sky and background. In order to put a little movement into the painting, Pangrazio and Barron added some miniature neon that purposefully looked like it had been around for 15 years or so. Also included was the blue screen element of the Thunder Road, the animated shadow of the spaceship and the infamous *Starkiller*.

"Some of that sequence was done as latent image," explained Nicholson. "They actually went to a drive-in in Glendale and shot some VistaVision plates and



combined it with a background painting of the neighborhood and night sky. Then we put in a blue-screen element of the Thunder Road and added a shadow to show that it was not part of the movie on the screen. The actual footage of the movie was done by L.A. Effects, in Los Angeles. They did their work in 4-perf and they gave that to us and we blew it up to VistaVision. Then we had a matte made of the drive-in screen and just composited the *Starkiller* footage into it."

Another matte painting innovation devised by Barron and Pangrazio actually had a car turning a corner in a painting of the night cityscape. Barron says that a miniature car constructed by Paul Huston was inserted into the painting using a mirror. The mirror allowed the 12 inch car to be scaled down enough to fit into the painting. The painting was done on glass with a space left for the reflection of the car. Barron says that the matte department is al-

ways trying to introduce movement in the paintings to complete the illusion of reality.

Finally, there is the sequence of the kids boarding the alien spaceship. A large and menacing robotic spider chases them down a hall. A second creature shakes them down and discovers Ben's picture of his girlfriend in his pocket. The spider was a traditionally stop-motion animated creature built by Marc Thorpe and animated by Tony Laudati. It was precision tooled with each joint in the leg operable. Laudati studied films of spiders so that he could recreate the movement correctly. A miniature set was built at ILM that matched the full-scale set at Paramount. The miniature set was only about two feet in diameter and the spider itself was only eight inches tall. Blue screen elements of the kids running down the hall were added in and the animation department added shadows.

The probe robot was built full scale at ILM for use on

the live-action set by Larry Tan and Bill George. George recalls, "The eye and the mechanism for pulling open the kid's pocket were mechanical puppets. I had to pull open and then reach in and pull out a picture of his girlfriend. It was really tough. It only took about ten takes but every time, it seems, the picture was upside down or I would grab it right on her face. I had to get it right on the edge and fishing around in a kid's pocket with a tube five feet long isn't easy." The only electronic parts on the probe were some lights on the eyeball. They were computer controlled so that they would go off when the shutter was closed.

Animated energy bubbles, flying spaceships, matte paintings, stop motion - *Explorers* was definitely ILM's most complicated summer film. Everyone had the same final thought regarding the project, though, "It's too bad more people didn't get to see it." Too bad, indeed. Δ

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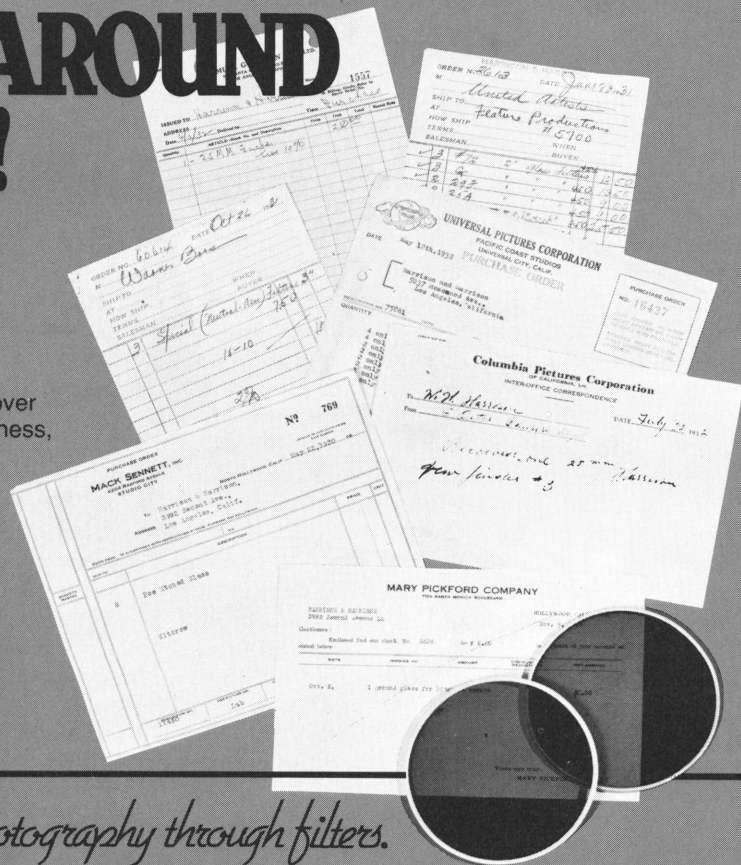
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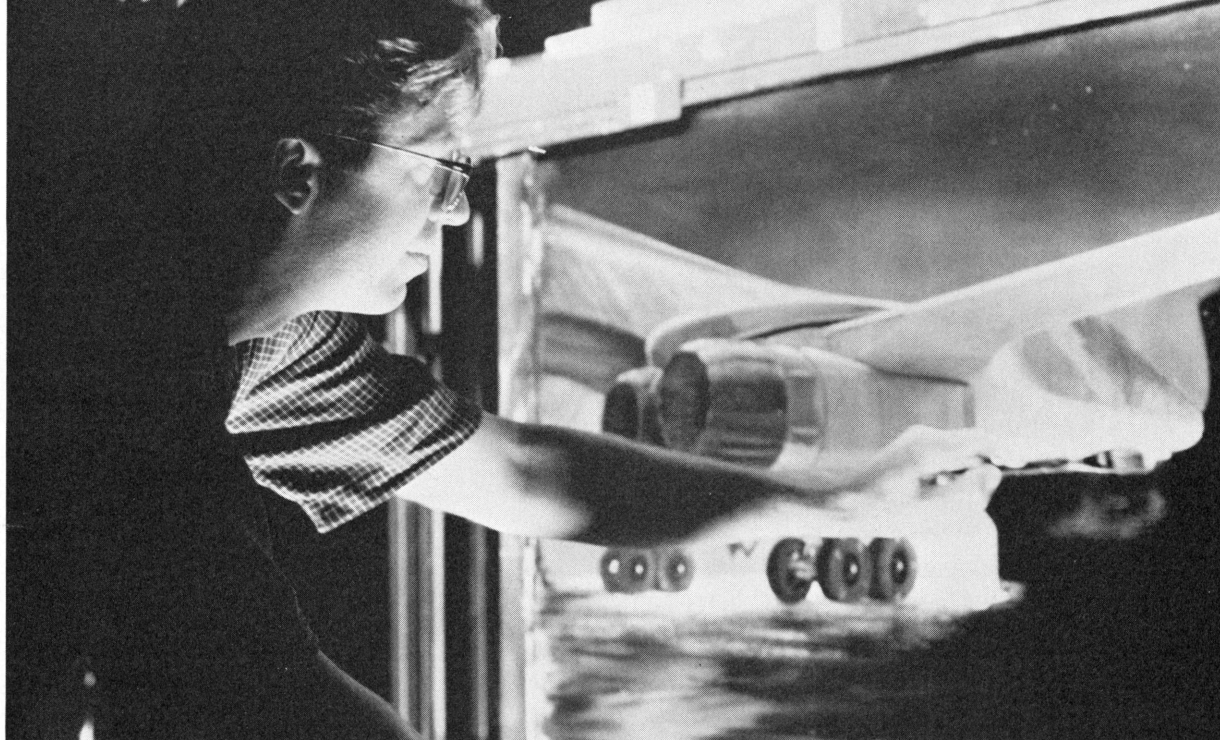
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A Full Bag of Tricks for

REAL GENIUS

by Adam Berger

Moviegoers will remember the summer of 1985 as the season of films about kids and science. Amidst the competition, Tri-Star released its own entry into the crowded genre: *Real Genius*, directed by Martha Coolidge. Although the film did only moderate business at the box-office, it received high marks from most movie reviewers, and proved to be a showcase for the technical abilities of many talented people in the field of special visual effects.

One key effects scene opens the movie. The sequence takes place in space, 200 miles above the earth. A small, shuttle-derived vehicle rises out of the atmosphere and climbs into orbit.

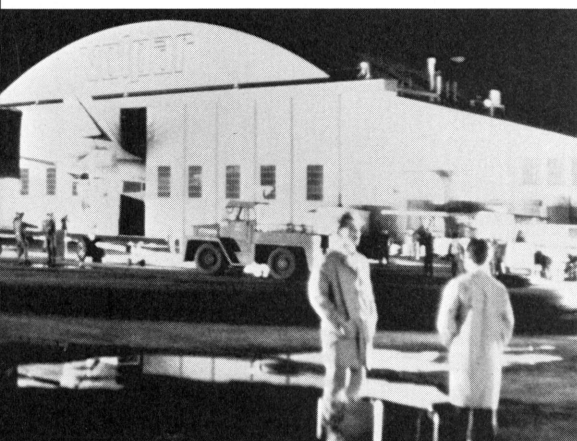
The lone pilot deploys a laser weapon, which he aims at a target on the ground. Upon acquisition of his target, he fires the laser in a brilliant orange flash. Far below, at a coastal resort, a politician is struck by the laser beam. The victim instantly vaporizes in a burst of flame. Mission accomplished, the pilot turns his space plane around and fires his de-orbit jets for re-entry.

One of the first people Tri-Star contacted for the space scenes was Richard Dowling, a professional space media consultant. Says Dowling: "I think they were interested in me because I had produced a briefing on a space-related weapons system for

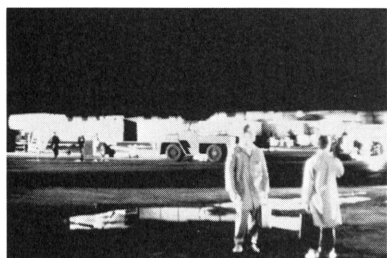
High Frontier [a private, non-profit organization dedicated to the promotion of a space-based strategic defense]."

Though he was originally hired to help develop a similar "briefing" film for the space plane demonstration in *Real Genius*, Dowling's responsibilities quickly grew. Soon he was busy coordinating virtually all the film's special visual effects, and serving as a major channel of communication between the various effects contractors and Tri-Star.

Dowling sent David Stipes Productions a set of preliminary storyboards rendered by production illustrator Alex Tavoularis, along with several blueprints of



Van Nuys airport disguised as a B-1 set minus plane. Below: B-1 set with effects area masked off.



the space plane, designed by Ron Cobb. Those plans depicted the "SR-82" mini-shuttle with the same near-fanatical attention to detail which has typified Cobb's designs in such other films as *Alien*, *The Last Starfighter* and *Back to the Future*. Cobb carries the motto "Form follows function" to the extreme, explaining: "If I work out, in intimate detail, how something works in real life, I know that these details are never going to be conveyed to an audience. But they do help me in arriving at the external shape, the position, and – if anything – that look of realism. . . . So, actually, it helps me think. It's a really good device for me to come up with a good look for something."

DSP's first effect, a shot of the earth as seen from the cockpit of the space plane during re-entry, was needed in a hurry. It was to be playing on a monitor during the CIA briefing scene, and that scene was scheduled for shooting the following week. David Stipes contacted graphic animator Ernie Farino. Using a NASA earth photo provided by Dowling, Farino proceeded to shoot the re-entry p.o.v. on his animation stand. Less than a week

later the completed scene was handed over to Tri-Star, in plenty of time to be projected on the live action set.

Meanwhile, in DSP's model shop, the modelmakers were already building two of the three miniatures featured in the film. Model Department Chief Dale Fay worked on the miniature SR-82 space plane, while his colleague, Erney Cervantes, got busy with the construction of a miniature B-1 bomber.

Fay's primary construction material was urethane foam, from which he carved the SR-82's main components, using copies of Cobb's blueprints as templates. The urethane was so soft, Fay was able to give it the proper contours using only sandpaper. He then skinned it with Bondo and resin, topped off with a resin sealer and spray paint. Most of the fine detailing was scribed into this plastic shell. Fay and Cervantes then painted the model grey and black to match Ron Cobb's paint scheme, and finally sprayed the whole thing with a coat of clear phosphorescent ink (a component of DSP's "reverse blue-screen" ultraviolet phosphor matting system, licensed from Apogee, Inc.) The finished model was slightly over two feet long and weighed about three pounds.

While the SR-82 was built entirely from scratch, the B-1 bomber was constructed from a 1/48-scale Revell model kit. However, modelmaker Erney Cervantes had to make extensive modifications, including the installation of a metal armature (providing a sturdy foundation for the model's four motion control mounts) and internal lighting for the jet engines. In addition, Cervantes built articulated "swing wings," as well as special removable landing gear and hatches (attached to the model by discreetly-placed magnets) so that the B-1 could be switched from take-off mode into flight configuration, or vice-versa, in a matter of seconds. The finished model was painted camouflage, to match references sent over by art director Jack Tay-

lor, Jr. Like the SR-82, the finished B-1 miniature was given a transparent coat of phosphorescent ink.

With the models finished, the emphasis shifted to the actual miniature photography. The task of programming and shooting the SR-82 scenes was given to DSP's chief motion control cameraman, Michael Karp, and his colleague, Marc Kolodziejczyk, under the guidance of visual effects supervisors David Stipes and Richard Bennett. First, a set of NASA earth photos, provided by Richard Dowling, were enlarged to poster size and mounted vertically beside the motion control track, along with an eight-foot-long backlit starfield. Mike Karp alternated the photography of these background elements with the model shots, sometimes re-shooting the Earths and starfields to better match the motions of the space plane.

At the far end of the motion control track, the SR-82 was mounted on DSP's computer-controlled model mover. The camera, a modified Mitchell, was integrated into a custom camera mover and the entire system was hooked up to a Tondreau Motion Control Computer, and programmed by Mike Karp.

Almost immediately, Karp and Kolodziejczyk encountered an unusual lighting problem. "The model mounts, since they were a nodal dog-leg, would glide through the light source," says Karp. "You'd have to have two lights supplying a certain kick or an edge light, where normally only one would be needed. One would take over as another was blocked out by the mount. So you can't even light until you have a finished move laid down. You actually have to watch the model in motion and light it while it's moving."

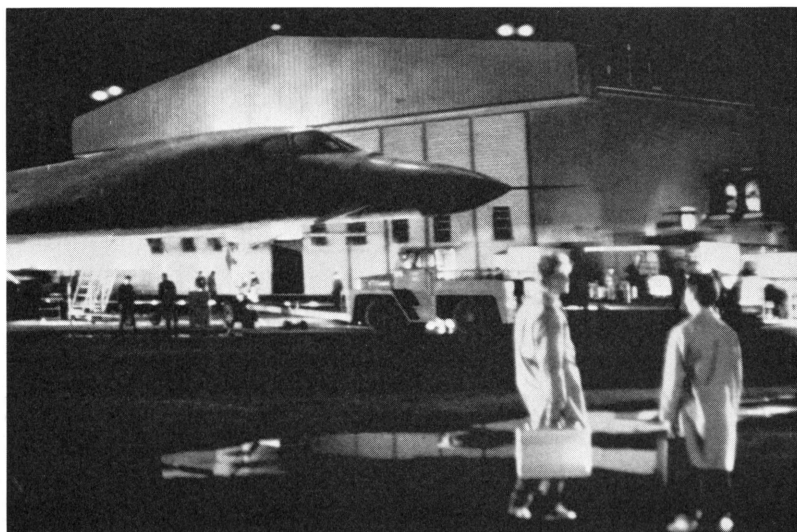
As Karp and Kolodziejczyk were busy shooting their motion control scenes, another set of space scenes was taking shape on a separate stage. The scenes called for a series of close-ups of the laser device as it emerges from the spacecraft, aims, and locks onto its target. Since the weapon was to

be seen in close detail, a special enlarged model of that section of the SR-82 was required. British modelmaker Ron Thornton was called upon to construct the model, while Erney Cervantes built an elaborate mechanical system which enabled the components of the weapon to move along four independent axes in exact increments. The model was built to 1/4 scale, and was completed in just under one week.

The motion control equipment was tied up with the other space shots at the time, so Stipes decided to have the weapon photographed using stop-motion. He called in animator David Allen. Assisted by Ron Thornton, Allen proceeded to animate the laser turret, deploying and targeting two frames at a time, using a technique known as "alternate frame front-light/back-light." First Allen set the model to its proper position. A single frame was exposed using the beauty lighting, with a black background. Then the beauty lights were switched off and a white card was illuminated behind the model (which was now in silhouette.) A second frame was then exposed, creating the matte element. Then the beauty lights were turned back on, the model moved to its next position, and the cycle continued. Later, in optical, the scenes were skip-printed to separate the matte frames from the beauty frames. The footage was then composited with a moving starfield element, and the image was complete.

In the midst of the SR-82 photography, Karp and Kolodziejczyk also had to deal with several B-1 shots. The first of these effects was to show the plane skimming just above the runway, backlit by the rising sun. The bomber heads straight toward the camera, finally soaring overhead as the camera tilts up to follow.

Several months earlier, Stipes and Bennett had shot a background plate of an empty runway at sunrise. Now Karp programmed a move on the miniature B-1 to make it look like it was actually taking off from that runway.



Below: *Final composite of airport set.*

Though the model was completely static, with the camera doing all the movement, Stipes, Bennett, and Karp came up with an ingenious way to imply that the plane was "real." The trick was a simple one: they mounted the key light (simulating the effect of the rising sun) on a large motion control turntable. As the camera approached the stationary model, the turntable slowly moved the key light to a different position, which caused a highlight to sweep over the skin of the plane. This subtle motion suggested that the B-1's geometric relationship to the background was changing. It was a subliminal effect, but there was never any doubt that it was vital to selling the shot.

Several weeks after work had begun on the effects, director of photography Vilmos Zsigmond, ASC, decided that certain shots should be photographed in Vista-Vision. Since, at the time, DSP was equipped only for academy and anamorphic formats, Richard Bennett contacted Apogee Incorporated and passed on the Vista-Vision shots to the company's Optical Effects Supervisor, Roger Dorney.

The Apogee scenes involved three motion control shots of the B-1 in flight, and 14 shots of laser beams. The B-1 scenes were shot on a "Dykstraflex" motion control system, programmed by cameraman John Sullivan. As before, the mattes were generated

using the "reverse blue-screen" process. Roger Dorney and his assistant, Cosmas Bolger, then composited the model elements against a moving cloud element (actually cotton batting against a painted sky cyc, photographed earlier in the production by DSP's Ron Thornton).

The model shots were relatively simple compared to the scenes involving the laser beams. Although most of the laser effects were achieved with conventional backlit animation, three of the scenes required the use of an actual laser. In one of these scenes – set inside a Victorian-style house – a laser burns its way through a stained-glass window, striking and igniting a giant vat of popcorn. "This is what Martha called 'the light show,'" recalls Dorney. "There was a practical light that the live-action crew had shot on the outside of the stained glass window that pans up." This practical was used to indicate the scattering of the laser light on the surface of the stained glass. Back on Apogee's stage, cameraman Doug Smith programmed a camera move on Apogee's live laser to match the movement of the practical. The move was shot and Dorney then printed the laser element against the live-action window scene, giving the effect that the laser was actually burning its way through the stained glass.

Several other laser scenes were achieved through graphic an-



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imation, as rendered by Harry Moreau. One shot was to show a laser beam coming from the sky and tracking along the ground, igniting the grass along the way. According to Dorney, the first-unit crew "... shot practical explosions traveling along the ground so we had something to track on that one. ... However, the speed on the practical explosion as it snakes its way across the field wasn't very consistent. It jumped around too much." Moreau managed to solve the problem by adding a roto-scoped sparkle to the tip of his animated laser beam. This "hot tip" element covered up the inconsistencies in the live-action background plate, and gave the scene the smooth feeling it required.

Other laser scenes were set in a university physics lab. Again, the beam was hand-animated by Harry Moreau. For the sake of realism, Moreau also added airbrushed reactive lighting to the scenes—reflections and highlights cast by the laser on the workbench, instruments, and other fixtures on the set. Although the scene lasts for only a few seconds on screen, these added details give it a much greater sense of veracity.

Much earlier in the production, another company became involved in the *Real Genius* effects: Universal Studios Matte Department (which later became Illusion Arts, Inc.). The group, headed by matte artist Syd Dutton and optical cameraman Bill Taylor, had been involved with the project since December of 1984. Dutton and Taylor were asked to generate two matte paintings depicting the B-1 bomber on the tarmac at night, as it is prepped for its mission.

The two live-action background plates were shot at Van Nuys Airport in late December, on what Dutton describes as "the coldest night I've ever spent in my entire life!" The set was quite sparse. Says Dutton: "They had the bomb bay doors. Those were on a scaffolding with light inside. ... They had made a pho-

tographic cut-out of the landing gear in front, and had two rear wheels. ... It was so people could walk in front of the landing gear." Location/matte assistant Lynn Ledgerwood erected a mask in front of the camera to black out everything in the frame above those props, thus leaving large areas of the image unexposed. The paintings would later be added in those areas.

The two background plates were shot on 5247 color negative, and held as undeveloped latent-image takes. Back at the studio, Dutton set to work rendering the matte paintings on large sheets of glass. A major concern for the director was that the plane have a "hungry beast" quality. Explains Dutton: "Martha (Coolidge) decided she wanted to have the plane camouflage painted. But at the same time she wanted that sort of a 'wicked glint' that an all-black plane would have. ... She wanted the plane to look 'nasty.' So it was a matter of painting the plane camouflage, but at the same time trying to make it look like it was black ... almost like it had black cellophane wrapped on it."

When the completed paintings were mounted on the matte stand, the latent-image negative was brought out of cold-storage and loaded into the matte camera. Bill Taylor and matte camera operator Susan Sitneck then exposed the painting into the masked-out areas of the live-action element. "We always try to do ... [our composites] on original negative, if possible," says Dutton. "It's better quality."

For an extra touch of authenticity, Sitneck exposed various backlit points of light traveling through the scene to indicate other aircraft and land vehicles moving in the background. The finished composites looked so convincing that most audiences are unaware they are watching an effect at all. △

Adam Berger is a professional screenwriter, as well as the owner and president of EgoVision Computer Graphics in Los Angeles.

Pygmalion Tries Again for *Weird Science*

by Susan Levin

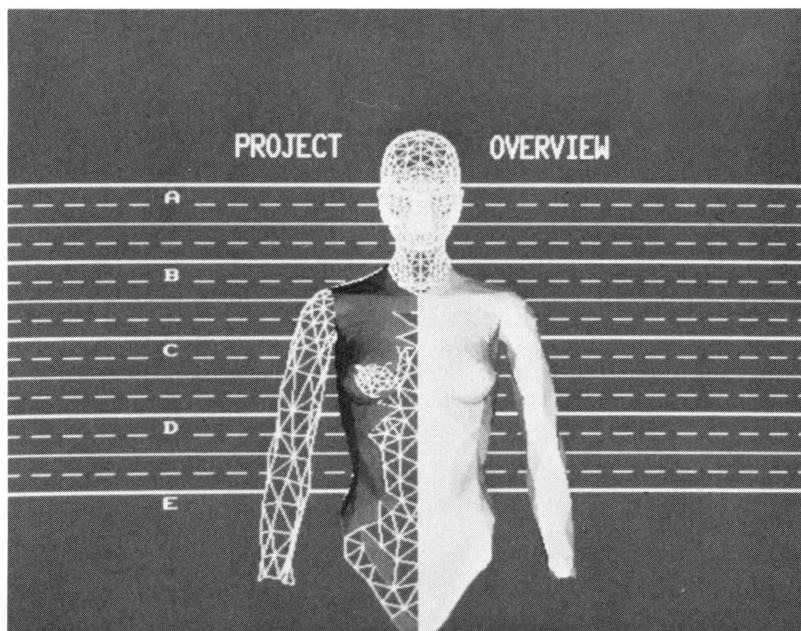
Weird Science may have a slightly outrageous premise, but sometimes one must look beyond the surface to find the shine. The notion that a computer has the capacity to create a woman is not so far-fetched. Entire worlds are created by computers. Graphics and animation have become so advanced it is often difficult to distinguish between the real and the imagined.

"Lisa" was created for this film by two boys who put their computer to the test. But actually, she was born on video, by the special effects experts at Video Image, who not only put their computer to the test to simulate a full human body, but stretched their imaginations to devise a vehicle through which Lisa would travel from computer to reality without spilling disbelief all over the screen.

Richard Hollander and John Wash, technical and art directors (respectively) at Video Image, oversaw the *Weird Science* project. In creating the woman, they started out by documenting a mannequin originally to be used as Lisa's prototype. Hollander, known for his work in such films as *Blade Runner*, *2010*, *Brainstorm*, was responsible for designing a data base capable of producing this three-dimensional form. In order to accomplish the feat, he first had to obtain all the information required for translating a 3-D object into computer language, a process known as digitizing. According to Hollander:

"When you have a shape that can not be modeled as a regular solid (such as cubes, circles, etc) or if no one has plans that are cross sections of the object on an incremental basis then one of the best ways to get it into the computer is just to go and digitize the surface of it."

Before entering the computer world, Lisa had to exist in ours. Well, half of her did, anyway. After finding store-bought mannequins unrealistically

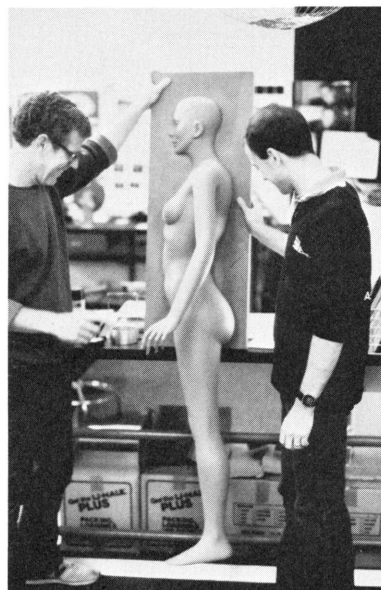


Wire frame Lisa figure being filled with shaded polygons. Below: Hosch and Wash plan arm placement. Note mirror for visualizing Lisa's missing half.

proportioned, a full-scale model of half a woman was specially sculpted by Mike Hosch for the task of digitizing. "We took the liberty of stating that the left hand side was identical to the right hand side, only mirrored, and so it saved us time," Hollander states. "Most people are not built this way, but for the graphic case it wasn't necessary to have two distinct sides. The film wasn't based on that kind of realism."

After the model was completed, the labeling phase of the project was put into action. Numbered points were needed to feed the computer the data for digitizing. With assistant John DesJardin, Hollander began what would become a two-day, non-stop, polygon plotting orgy.

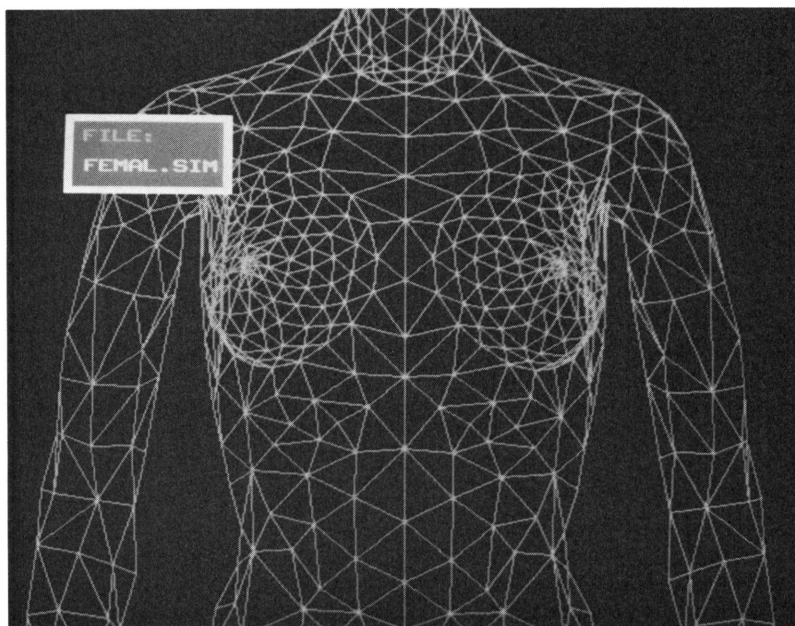
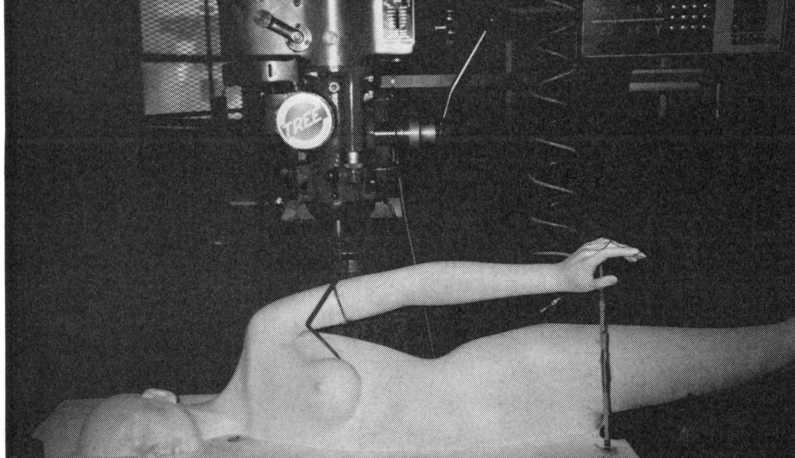
"We had the whole body smoothed so we could write on it," Hollander recalls. "We went in and marked points with a one-colored pencil, that represented vertices of polygons, all over her body. We put these points in such a way as to increase the



Photos by Video Image and Universal Studios

number of points per square inch where it was very curvy, and decrease the number of points per square inch where it was not so curvy. More data is needed around the curves, but if it's a

sculpture on milling machine. Digital readouts are visible. Below: Wire frame of Lisa's normal torso.



big, flat area, only three points spread apart are needed to define that area. Every time we made a point, we also numbered it . . . a little small number, right on the model."

In order to conduct the process as efficiently as possible, the model was subdivided into sections, each section assigned points and corresponding numbers. The points, or vertices, were then connected into triangles, with each triangle receiving a number. When all labeling was completed, the model was taken to a milling machine, where a small metal pointer placed on the chuck of the mill acted as reference.

DesJardin moved the model in various positions, and used the digital readouts generated by the mill to get 3-D coordinates in space. For every vertex labeled on the model, there were three numbers (the x, y, and z coordinates) recorded for use in the database. The model was positioned to

move in all directions, allowing full control and the ability to obtain any desired point in 3D space.

All labeling information was then recorded into the database, which enabled the computer to "read" the three-dimensional object and translate it into a language the viewer could understand . . . a visual image. Hollander explains, "This is the phase where DJ (DesJardin) entered the points, using the special program that we wrote, to enter all the vertices and describe the polygons . . . how they're connected, which vertices are there. That formed a coherent data base that we used in the current system." The image was then filmed directly off a video monitor, while connected to the computer from which it originated.

The end results were displayed full screen, though originally planned as inserts. According to Wash, the director (John Hughes) wanted that

option. "We originally thought that the material would be played back just as we normally play it back. It just got to the point that full screen was the most effective way for it to be integrated into the scene, and we were very happy with that, and very pleased with the results."

Lisa was born beautiful. Yet, the whole is only a sum of its parts. For Lisa to become the "complete" woman, one with brains and beauty, (and an uncanny resemblance to Kelly LeBrock), she had to be constructed with heroic attention paid to detail. As part of the storyline, the boys (played by Anthony Michael Hall and Ian Mitchell Smith) were required to feed various information into their computer, including photos cut from the pages of *Playboy* magazine. Wash was in charge of furnishing a look for this scene, and because Lisa was built not unlike a construction project, he chose a blue background with white typography as the design element on which she would be created. This blueprint theme provided a cohesive design element for all the different scenes that were intercut with her construction. According to Wash, this format helped tie everything together and immerse the viewer in a little world with its own internal logic. He discusses how he came up with such ideas: "We used to do drawings (on paper), but now most of the design work we do is on the computer . . . a lot of times, even if it's a three-dimensional scene, I'll go into Easel (the computer's paint program), and start drawing my idea of what it will look like just in two-D. It's a real easy way of getting an idea up. Instead of putting it on paper, you can do it on the computer and it will give the director or whoever needs to consider it, a much more accurate idea of what the final product will be because it's generated on the same system."

A similar attitude of design unity can be found throughout *Weird Science*. When the boys decide to break into the military's mainframe computer system, a series of animations splash across the screen. Wash first created the sequence with the idea of an arcade game, but later modified it in favor of a tunnel look. Wash reflects, ". . . there's a whole design consideration that comes into what is practical, what will 'read' to the audience. We

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only have, in most situations, a limited amount of time to get some simple or complex idea across to the audience. You always have to judge that in terms of color, line quality, and all the other graphic elements that make up the shot."

In the script, the break-in sequence was abstractly defined, leaving it open for input from Video Image. Wash and Hollander were inspired by the creative freedom. Hollander recalls, "The best part of the project was doing crazy graphics that didn't have to relate to some of the more standard type of graphics that we do. So we got to put in a lot of our own ideas that John Hughes was looking for."

The break-in sequence was a visual representation of what traveling through a computer would look like. The sophisticated images achieved with the graphics for this segment were definitive eye-stoppers. High-tech wizardry painted a multi-colored Warhol-esque wonderland of a journey even Alice would have envied. Most of it was designed around a hexagonal tunnel that drove one through a graphic environment having nothing to do with reality, only a created one.

But no matter how smooth the product on screen, the sequence was not made without its share of difficulties. Wash States, "The system we use, Cubicomp, is a frame buffer, which is a separate box that interfaces with the IBM PC and holds the images that we're working with in memory. In terms of motion it's generally suited for looking at an object and moving the object in front of you. It's not very well suited to moving through a stationary environment. You have to play a lot of tricks with the system to get it to do that right. Special programs were designed at Video Image to offset limitations of the system.

There were many running gags throughout the film, and true to form, the hormonal karma possessing our heroes gets the best of them. In one particular scene, they contemplate just how big a woman's breasts should be, before becoming offensive to the public. While they tinker with this idea, a series of images is displayed by their computer monitor, revealing a succession of wire-frame breasts growing before our eyes at the touch of a button.

Hollander devised a program that allowed the breasts to not only expand in area, but in mass as well. Though, technically there is no mass to an image, the illusion was successfully conveyed through the implementation of Hollander's software. When we see the breasts enlarge, they do so in a dimensional fashion, protruding from an invisible center point. Thus, rather than a simple linear representation, we are treated to the full-blown potential of digital artistry. The scene evokes a comical appreciation, as did the behind-the-scenes creation of it.

The time spent perfecting this scene reflects the ongoing concern for originality at Video Image. According to Wash, each project worked on is given a unique look; even if creating it involves something as minute as a change in typography. He explains, "It's very easy to fall into the trap of merely taking the tools that exist and shuffle them around in a different way and saying . . . 'well, this is new, this is different', when it isn't really that new or different. The challenge is to always make that extra effort."

Computer animation and computer graphics have come a long way since their inception. However, after talking to people in the field, there seems to be a consensus . . . it is not moving fast enough today. The creative capacity of the animators and graphic experts behind the keyboard exceeds the available software on the market.

"When we were done with '2010', says Wash, "I was impressed with where we were generating graphics from a computer. But as time goes on, we've all reached a plateau where we want more and want to do things quicker. We want software that's smarter. I think it's time for the level of computer graphics that we're using to take a quantum leap."

If Wash's forecast is realized, perhaps in the near future we will see more outrageous fantasies come to life on film, and distinguishing between real and imagined will be as impossible as say . . . creating a woman from a computer. △

Susan Levin is a recent graduate of the University of Michigan with a bachelor's in film. Video Image is located at 4121 Redwood Ave, Los Angeles 90066.

Title for *Twilight Zone*

by Jean Turner

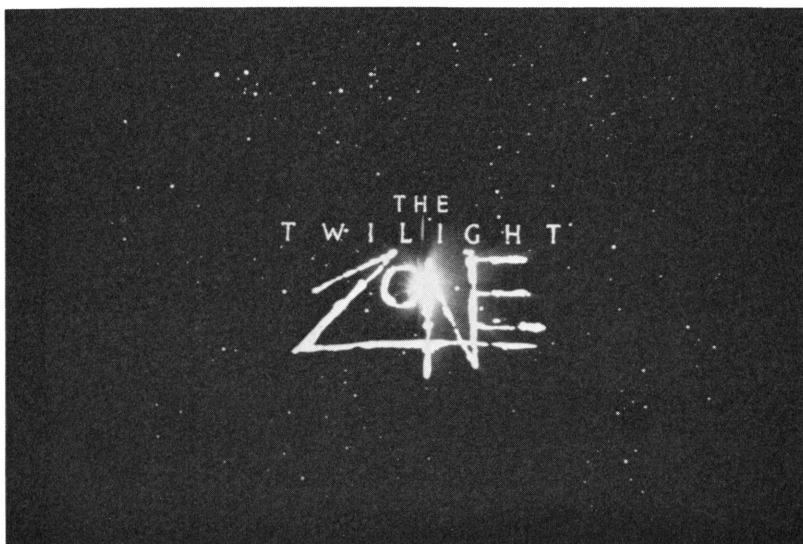
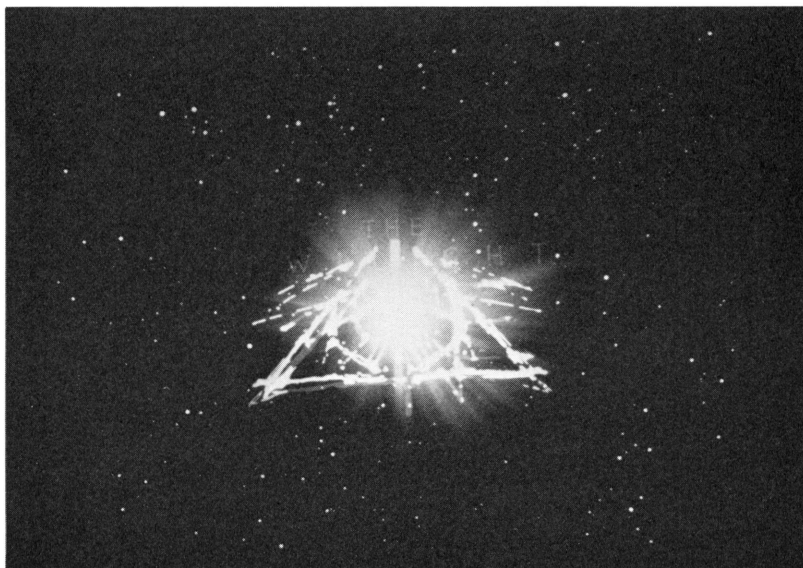
From the mystical vapors of recent history emerges television's new "Twilight Zone." Rod Serling's great success with a format remembered by elders among us and renewed with juniors by means of syndication, is too good a premise to die – at least this is the hope of CBS which has initiated a series of new looks at an old idea.

In order to pay homage to yesteryear and yet be something new, producer Phil DeGuerre wanted unique introductory titles. For the sound track he turned to The Grateful Dead. For the art and development of a new nightmare which evolves into the words, "Twilight Zone," he turned to Gary Gutierrez.

Gutierrez and his partner, Drew Takahashi, formed Colossal Pictures in 1978 and have since been involved separately and together in the special effects for such titles as *Cotton Club*, *One From the Heart*, *The Black Stallion*, *The Right Stuff*.

The Right Stuff was Gutierrez' most gruelling experience for special effects creation. He recalls: "It required two years and we pushed into so many areas – old and new. I got involved very early, storyboarding the entire film. By the time it was over I felt as though I had been mustered out of the air force! People asked me after *The Right Stuff* about the Lydecker Brothers and I had never heard of them before! I discovered through research that they had done similar effects for *Flying Tigers* a long time ago – not all the same tricks, but generally the same approach as we used on our flying and space effects.

On "The Twilight Zone" there were no wires or space ships. The title introduction – a landscape from which the viewer retreats into an empty room through a window that slams shut, whirls into a crystal ball filled with dream images, and closes with the



name of the show in a bizarre, twisted typography – is the product of storyboards inspired by the sound track. "This is not at all the usual procedure," says Gutierrez. "I mean, working on the art after hearing the music.

"Michael Hamilton, our art director, did a conceptual painting from the storyboards. We used a window instead of a door. A window is a metaphor for a passageway from one place to another. The crystal ball whirls into a

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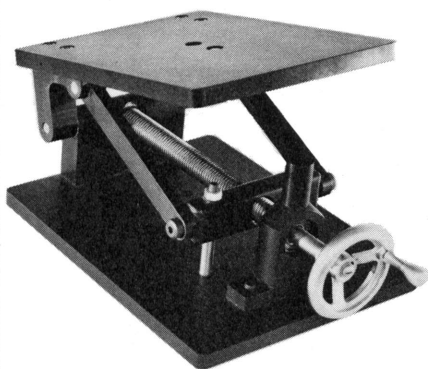
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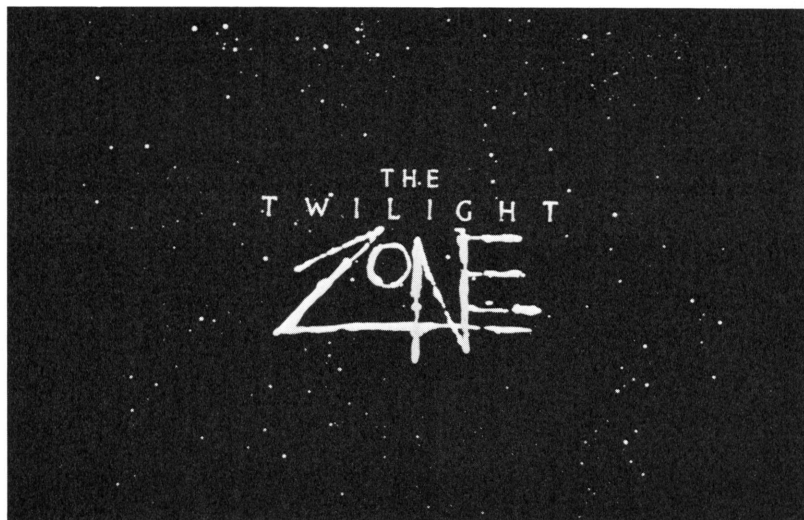
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"We used a green Ultimatte screen outside the window in place of the landscape so that any kind of image composite can be used in case of varying show themes," Gutierrez continued. "They can composite a video image or anything they wish to illustrate a particular show.

"The Serling image is so ephemeral that it is almost imagined rather than seen. We did it as an homage to the old series and it works."

"Tim Boxwell does our storyboarding, including the 'Twilight Zone' sequences. For me, storyboarding is a design exercise and for a massive production I don't have time to do it all myself. It is a good exercise in wrapping your head around the problem and seeing how a simple shift in camera angle can make a change in the visual effect itself or in the cost of how it is done."

About the "Twilight Zone" titles, Gutierrez said: "Phil De Guerre was looking for a way to put his fantasies together and come up with something unusual. He had contacted The Grateful Dead (the rock and roll band) to do the sound track and since a long time ago I had done animation for their feature film, they suggested I be called about doing the effects. Phil knew of my work on *The Right Stuff* from Bruno George, with whom I had worked at Modern Film Effects. Michael Hamil-

ton, the art director, was overseeing this 45 second extravaganza and we mixed ideas. He liked my approach and we went from there.

"By steps we worked together. Hamilton got Merle Saunders, one of the musicians, to stay in close contact with me so that I knew what the sound track was like. It is not at all usual to design from sound, so to speak, but we found it very helpful to hear the music and imagine the pictures.

"Phil has a book of iconographic imagery. You can look up any word — like spider or horse or clown or lightning — and it will have mythological and cultural poetic references to that noun which helps explain how these things fit into the human subconscious. We sort of brainstormed the list for what we thought of in connection with Twilight Zone stories — dream and nightmare imagery. We culled the list down to the kinds of things we might include in the crystal ball you see as part of the title sequence. We shot these images and then we did an off-line video edit of the range of imagery to come up with the best mix and most interesting flow. Then we created our opticals to match that template we had done on video. That's how the pictures inside the crystal ball emerged."

Gutierrez' company, Colossal Pictures and its subsidiary, USFX, are situated in the Bay Area of California where the members find an unusual pool of specialized talents for specialized jobs such as the very unique titles for a very unique latitude, the "Twilight Zone."



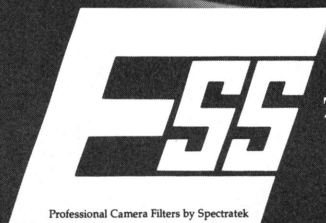
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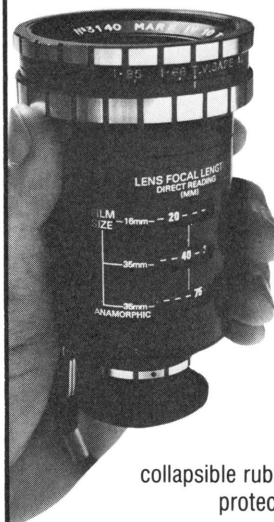
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VistaVision Nose Cone

by Bill Bremer

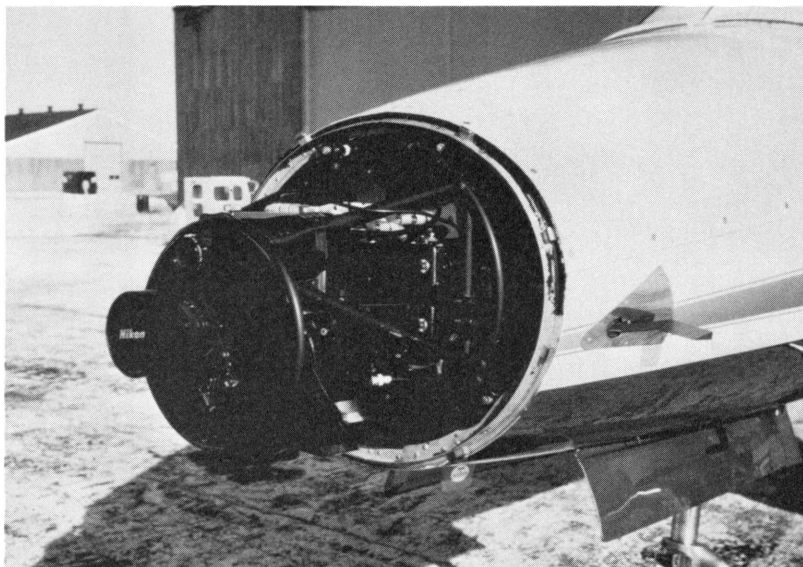
In the four years since its original development for the Clint Eastwood film, *Firefox*, the VistaVision nose cone system of Apogee, Inc., the Los Angeles-based special effects house, has proven a very popular piece of equipment to film and commercial directors alike. Because of the two innovative contributions it has made to the field of special effects, the introduction of the larger format VistaVision to aerial photography and the ability to combine that photography with in-studio live-action miniatures via a motion control system, it has been used to provide effects for, among others, the fantasy adventure, *The Neverending Story*, the James Bond extravaganza, *Never Say Never Again*, and numerous television commercials, including spots for Nissan by director David Dryer.

When Apogee, Inc. was first approached to do special effects for *Firefox*, it was apparent that the aerial photography elements of the film would present a number of special challenges. In addition to depicting the maneuvers of the Firefox aircraft itself, a jet fighter with capabilities far surpassing any existing aircraft, it was necessary to shoot in a variety of demanding locations, from the Sawtooth Mountain Range of Idaho to the ice-covered landscapes of Greenland in order to obtain choreographed aerial footage which could then combine with in-studio live-action miniatures for Mach 6 chase and combat sequences.

After sizing up the job, director of special effects John Dykstra contacted Clay Lacy, the world's foremost Learjet photo pilot. The Apogee-Lacy connection goes back some years and includes both film work and television commercials. "I like working with Apogee," observes Lacy with a smile, "Because they always start by saying, 'Here's what we want to do' and it's usually something I've never heard of before." In addition to flying skills of

the calibre needed to photograph such ace performers as the Blue Angels and the U.S. Air Force Thunderbirds, not to mention numerous stunts such as the gear-up belly landing of a DC-3, Lacy possesses the only U.S. jets modified for the Astrovision camera system, which he helped develop. This system from Continental Camera consists of a specially rigged 35mm camera mounted on either the top or bottom of the forward passenger compartment of a Learjet and features a video tap connected to a monitor on the glare shield, allowing the pilot, by maneuvering the jet, to frame each shot. For Apogee's purposes, however, it was decided that a VistaVision camera would be mounted in the nose compartment, which usually houses the radar equipment.

"Because of its long, slender nose and aft engines," reasoned Dykstra, "A Learjet modified in this way allowed us to use a very wide angle lens and still get unobstructed shots. Though we did take some shots with the Astrovision system, it uses a periscope lens and the light passes through 17 elements, so the resulting



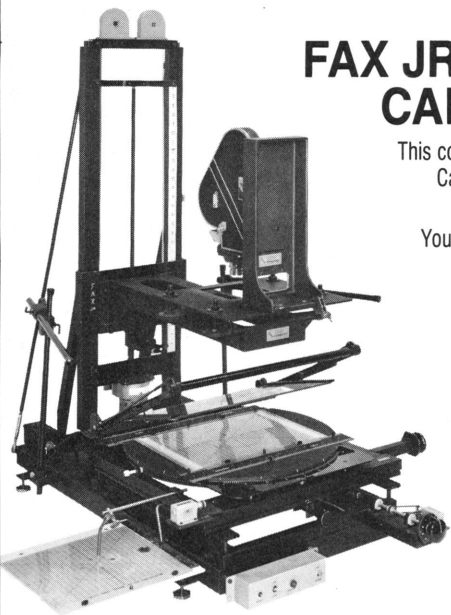
Mounted VistaVision nose cone. Below: Dykstra and Clint Eastwood confer between flights.

Photos by Michael Middleton/Apogee



shots of cloud formations, for example, wouldn't have been as sharp as we like. We prefer the larger format of VistaVision for our effects, and by adding as wide a lens as the Nikon 15mm flat field, which gives a field of view of nearly 180° (measured diagonally) in a rectangular picture, we were able to accentuate movement through clouds and sunsets and amplify the apparent speed of the Firefox craft, as well. The shots taken with the nose compartment camera were also capable of rearward points of view, simply by running the film backwards."

For pilot Lacy, there were other reasons, as well. "Because it's



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the highest performance civilian aircraft, with a wide speed range, the Learjet is the only answer," he states. "Plus, it's big enough to be a self-contained unit, holding the film, equipment and crew, and still retain that high performance."

Prior to the introduction of a butterfly VistaVision camera to the nose cone, a number of physical modifications had to be made under the leadership of veteran camera and systems engineer Don Trumbull. "I checked out the nose cone," recalls Trumbull, "And estimated it could just barely fit a Vista-Vision camera with a 15mm lens and 1000-ft. magazines modified to bi-pack over and under, behind the camera."

With the assistance of Richard Alexander, Bill Shourt and Mark Cane, a chrome moly tube "basketball hoop" rig was made to hold the camera within the tight fit of the cone, and a special mount, with motor drive assembly operable from the co-pilot's seat, was added. The 1000-ft. film magazines, which Trumbull obtained from Air Force gun camera, were needed in order to optimize air time. Positioned horizontally behind the camera, they necessitated construction of a transfer box to feed the film from the mags, zigzagging through the available space, into the camera. In addition, pressurized heated air was ducted into the cone to prevent condensation at high altitudes.

Douglas Smith, who served as camera operator on a number of flights, notes, "Because the mags were situated behind the camera in the cone, everything had to be removed in order to reload the camera. It took two men to do it efficiently, but we eventually got the reloading down to twenty minutes, minimizing the time between flights."

Once the fitting of the Vista-Vision camera into the cone was accomplished, the next problem to solve was the depiction of the incredible speed of the aircraft, including rates of acceleration and deceleration far beyond the capabilities of existing jets. The answer, to vary the speed of the camera in order to expand the apparent range of that of the craft, posed problems of maintaining exposure over a wide range of camera speeds and coordinating the iris opening accordingly.

Alvah Miller, head of Apogee's electronics department, designed the Apogee aerial camera controller, which controlled the camera speed and

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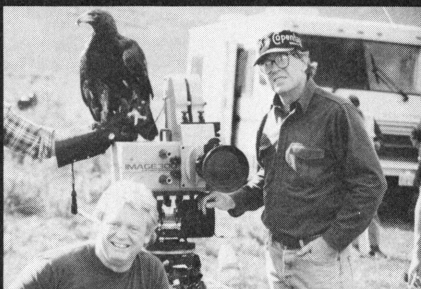
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counted the frames. It also controlled the lens iris through a remote servo, with the added capability to compute and set the proper f-stop, to any given reference exposure, for every camera speed from 24 fps down to 1/2fps. The footage taken from Firefox's point of view could now be varied continuously, with constant exposure, to give the impression of truly incredible speeds.

Experimentation with this device, however, revealed that, at slow speeds, manual operation of the controller lacked the precision for uniform rates of acceleration and deceleration. A camera speed ramp control, again designed by Miller, and added to the camera controller, provided the answer. This device used computer software, developed by Matt Beck, to accelerate and decelerate the camera speed according to curves designed from Dykstra's estimates of the fictional jet's performance abilities.

Modifications were then made to the camera lens to extend the f-stop range to 32 to allow for greater speed changes. In addition, John Sullivan, who often assisted Dykstra on board the jet as camera operator, notes, "Nikon lenses are designed with spring-loading to stop down, shoot and open again. To ensure smooth and accurate iris openings we had the lens modified to spring-load in both directions."

After testing different films for minimum grain buildup through the full optical range to be utilized, 5247 Eastman was chosen for the job.

All controls were wired into the passenger compartment and the system was now set for the introduction of VistaVision into aerial photography. With the capability of controlling camera speed with constant exposure, it only remained to determine a way of tracking and recording the precise attitudes and movements of the Learjet in relation to the camera exposure time and speed. This was necessary to coordinate the airplane's (and, hence, camera's) movement with the in-studio miniatures photography for the chase and combat sequences.

The solution was found by introducing a Litton Inertial Navigation System (INS) connected to an Apple computer. This device recorded positional data to correspond with each frame of exposed film. Later, in the shop, interpreting programs would

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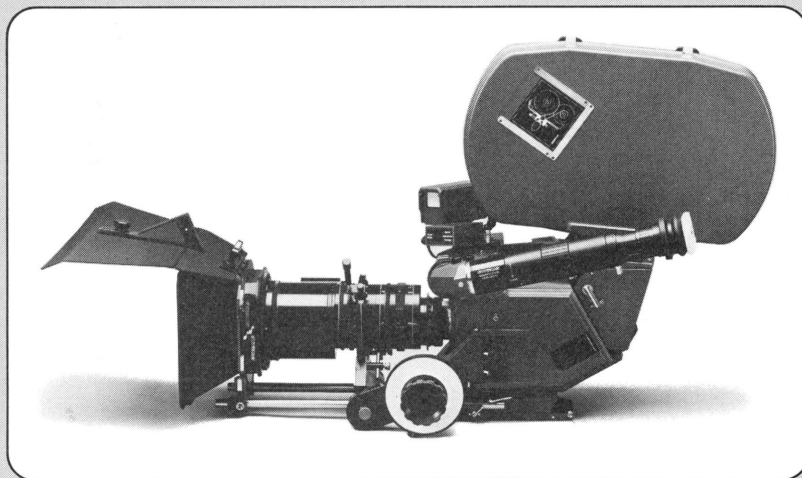
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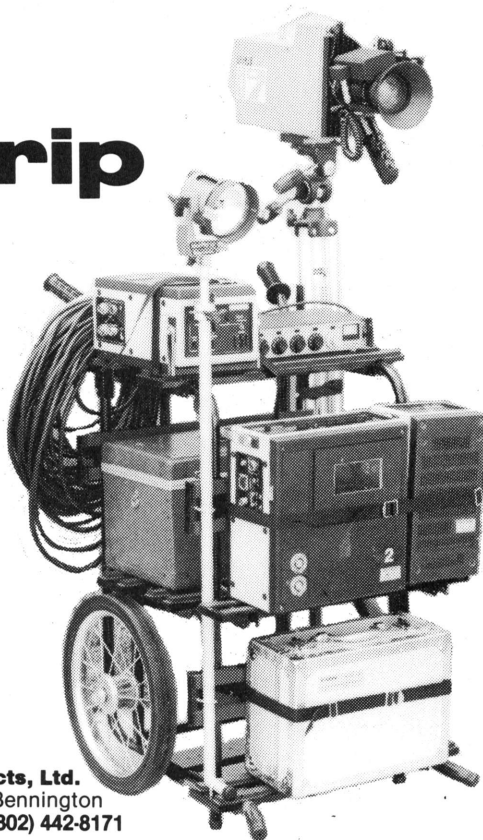
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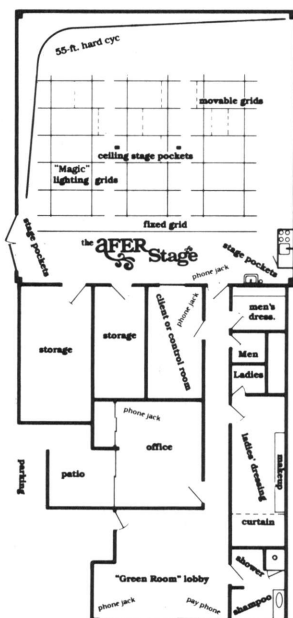


translate the angular displacement of the aircraft's movement (roll, pitch and yaw, in addition to velocity and "bounces" or other moves due to turbulence) for the model tracking.

With the entire system in place, and testing out of Van Nuys Airport completed, shooting commenced in Greenland. For three weeks, maneuvers offshore, onshore, over water and ice floes, and through cloud layers, gave the camera system, and the crew, an intense workout. Several more days shooting maneuvers over the Sawtooth Mountain Range in Idaho and Montana, followed by several days shooting clouds and sunsets on the edge of Hurricane Dennis just outside New Orleans, provided a strenuous testing of both method and technology under a variety of conditions. The crew on board consisted of a pilot (Lacy), co-pilot, Dykstra, a camera operator, assistant camera operator and camera computer operator (Beck). Director Eastwood also joined the crew on many of the flights.

"One example of the kind of maneuvers and stress we put on the system was the approach shot we did in Greenland to show Firefox's point of view as it came in for a landing on the ice," recalls Lacy. "I started at an altitude of 25,000 feet and took as steep a dive as possible at 300 mph. As I came toward the ice, I eventually brought the jet's speed down to about 120 mph and leveled off for the approach. With the camera speed ramping up from 3 fps to 24 fps, the apparent speed of Firefox went from 2400 mph to about 120 mph. One thing I always had to keep in mind was that if a jet were going 2400 mph, it would be rock steady in the air with no bouncing whatever. This called for a very smooth and steady hand on the controls to get the effect."

In spite of the sophistication of the electronics aboard the Learjet, the system worked well, though a few problems did appear. Matt Beck observes, "In a few instances, the INS was thrown off by Lacy's aerobatics, which meant the measurements had to be taken off the film itself, frame by frame, and fed into the computer. This made the post-production a little more complicated, but it never resulted in the loss of any shots."



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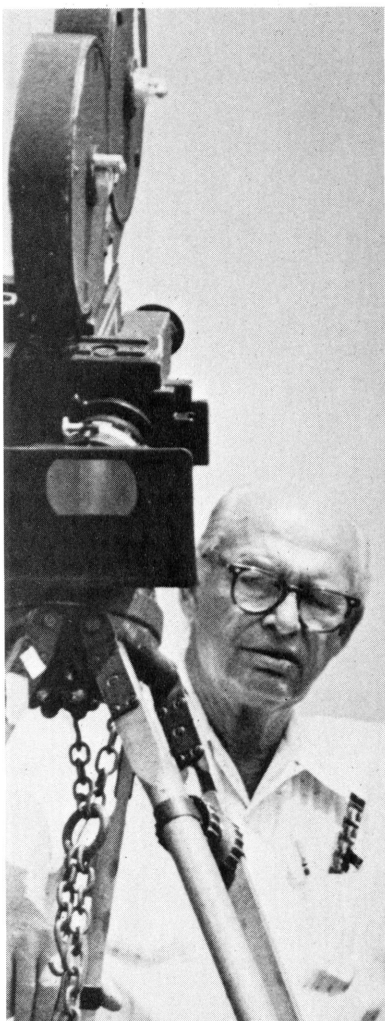
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Mother Nature pulled a prank now and then, too. John Sullivan notes, "There were a few variables which we couldn't control. Since the camera always faced forward, on takeoff we occasionally suffered bug hits on the glass dome over the camera lens. If we noticed it, we'd land and clean off the lens. Sometimes we didn't notice, but were still able to use the footage by strategically placing the models over the hits in the finished picture. Considering the extreme locations we shot in, though, it was no more than a minor inconvenience."

The VistaVision nose cone camera system is available for rental from Apogee, Inc., either with or without the motion control system. Upcoming refinements of the system include adding pan and tilt capabilities. △

Bill Bremer is a television writer from New York who now makes his home in Los Angeles.

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Star Chaser, the Legend of Orin

by Les Paul Robley

One day, many eons ago, effects animator John Van Vliet got a call from associate producer Daniel Pia: "You do effects?" "Yes," he replied, not knowing what to expect.

"Okay," the voice answered. "You've been recommended. Like to go to Korea?" And six days later Van Vliet was on a plane to Korea.

This apparently happened to a number of Southern Californians who were called in to "save" a Korean animation adventure that was taking a little longer than expected . . . about two years too long. Its budget was already three times past the \$2 million originally intended.

Star Chaser: The Legend of Orin is one of the last of a long list of 3-D features that opened to mixed reviews and attendance in the recent past. *Star Chaser* is the first (and some of its crew hope last) 3-D feature to be entirely "animated."

According to first-time Korean director Steve Hahn, creator of the *Star Chaser* concept: "Basically we're dealing with a 2-D medium of cel animation and turning it into 3-D. This creates problems well beyond those found in an ordinary 3-D live-action feature which employs objects that are already three-dimensional.

"The early 3-D shorts of the '50s merely displaced the same artwork by means of pan calibration bars on the animation stand, and then shot it again. No attempt was made to accurately resolve the problem of foreground objects having a different degree of divergence from background and midground objects. Our system is unique to animation, using computers to come up with the proper divergency factor."

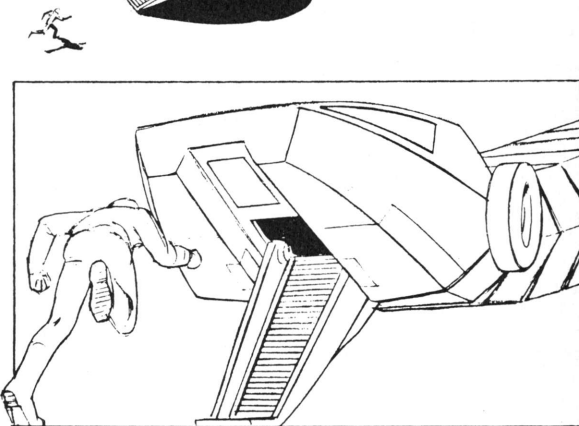
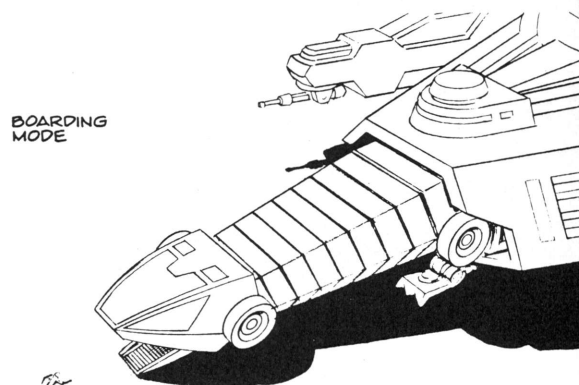
John Sparey is in charge of the 3-D computer effects necessary to put *Star Chaser* into orbit above our heads in the auditorium. He's listed in the credits as associate director, but he

prefers to call himself "bottleneck coordinator" of the production. His previous 11-year tenure as right hand man on all of Ralph Bakshi's films from "Fritz" to the present didn't really prepare him for what was in store on *Star Chaser*.

"I walked into the project in October of '82 knowing nothing at all about computer animation," he admitted. "On other pictures I tended to coordinate or rough out a large number of the layouts to work with the mechanics before they went through layout hands. Then on this picture I got into plotting and planning the computer moves on the ships as another aspect. Of course, I still prefer to think of myself as an animator. I tackled the movement of the ships as animation, since they're planned frame by frame rather than as a constant motion."

Primarily scenes involving spaceships or the cockpit interior of the *Star Chaser* ship were computer-generated. Also, shots of ore cars moving in perspective throughout the mine tunnels were handled by the LNW 80 computer, to alleviate pressure on the animators. The LNW isn't the most sophisticated computer in the world (equivalent to the little finger of the Cray X-MP used on *The Last Starfighter*). But it was of sufficient memory to duplicate and match the hand-drawn cartoon elements of the sequences made by animators in Korea.

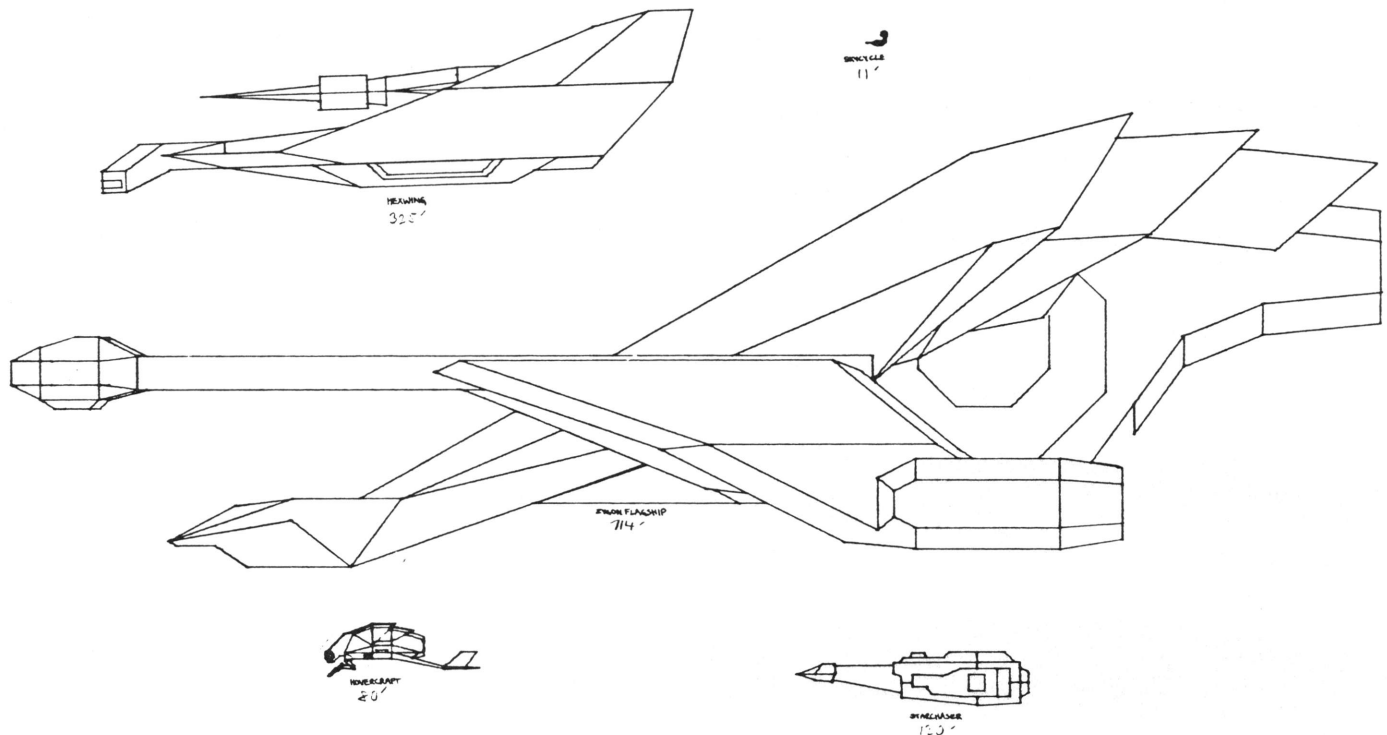
Preliminary work for any sequence began with the script and storyboard. Once a creative approach was agreed upon, physical production could commence with the encoding, drafting operation. The ships first had to be designed by Tom Warkentin, an artist known for his work on *Heavy Metal* magazine, and the movie spinoff. He and his associate made top, bottom, front and back drawings on graph paper of each object, similar to the method used in creating mechanical engineer or architectural blueprints. The completed



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drawings were then placed on an encoding table and from a chosen point of origin, the distances to all points were measured or digitized into the computer's memory bank. The information represented in the drawing was input in such a way that the exact proportions of the ships were turned into 3-D mathematical structures of x, y and z coordinates which physically exist within the computer's memory. By encoding one view of 3-D data you now have all views, a concept that saved enormous time in the encoding stage.

Each surface of the ship was represented in the computer as a family of little square patterns, called polygons (minimum units of detail used by the computer to remember surfaces). Joined together in groups, these encoded polygons were stored to approximate the



outer surface of an object's shape.

It should be pointed out that a film like *Last Starfighter* employed 350,000 polygons with peaks of over 4 million to try and simulate reality. This became necessary to create the texture, curves and dents on the surfaces of ships. In *Tron*, an average frame had 7,000 polys with peaks of 15,000. For an animated film like *Star Chaser*, only a limited number of polygons were needed to generate opaque planes that could block the view through the ships, thereby making them solid objects.

So, in terms of level of detail, the computer-generated objects in each of the three films have very different looks. *Starfighter's* world was posited as poly-intensive live action, reality. *Tron's* look was posited as an artificial environment, made up of the cold, voltaic impulses existing within a computer. *Star Chaser's* poly-limited universe was not striving for realism since the images were ultimately turned into straight 2-dimensional lines on animation cels and colored with flat cel vinyl paints.

Once the encoding process was finished, the data was stored on disc as a database. "For *Star Chaser*, each computer program filled up a disc with information," said Sparey. "The cockpit scenes alone required up to ten programs to cover all the various points involved. Once the computer has all those points it can give any view the programmer wants."

When the encoder-drafter was fairly confident there were no holes in the image and the ship or typography was perfect, it was then ready to pass along to the next step in the operation – the technical direction stage. This stage involved the technical director, or "animator" as Sparey prefers to be called. (It is equivalent in live action to preparing to shoot on a sound stage with actors or miniatures.) It here became necessary for Sparey to compose the background and foreground objects into the proper perspective with the correct degree of divergence necessary for the paired 3-D drawings. In addition, he now had to plan the action of the ship as animation, using the computer to plot the scene's mechanics.

Under normal circumstances, computer animators use interactive display stations to allow for the real-time rendering of specific scene elements called up from the computer's prop department. A "vector monitor" displays objects in a black and white series of lines to effectively choreograph the action. This is equivalent to an electronic storyboard that actually moves. A "raster monitor," similar to a color videogame's display, aids in adjusting the color and lighting of the scene. Unfortunately, *Star Chaser's* animation procedure and budget did not permit this kind of interactive ability between man and machine.

"We had no real-time view-

ing of the kind used on *Starfighter*," said Sparey. "We didn't see the actual movement until we had the ships printed out on cels and shot with a video camera. If these looked okay, we then proceeded to the filming stage."

Sparey made curves designating the movement of the ship in depth by plotting the desired x y z coordinates and yaw, pitch and roll positions for the ship. He also had to determine the angle at which the entire image would be seen from the camera's point-of-view.

It was at this final stage that decisions concerning motion were made. Using a video camera gave the director the opportunity of perfecting the action before the final filming operation.

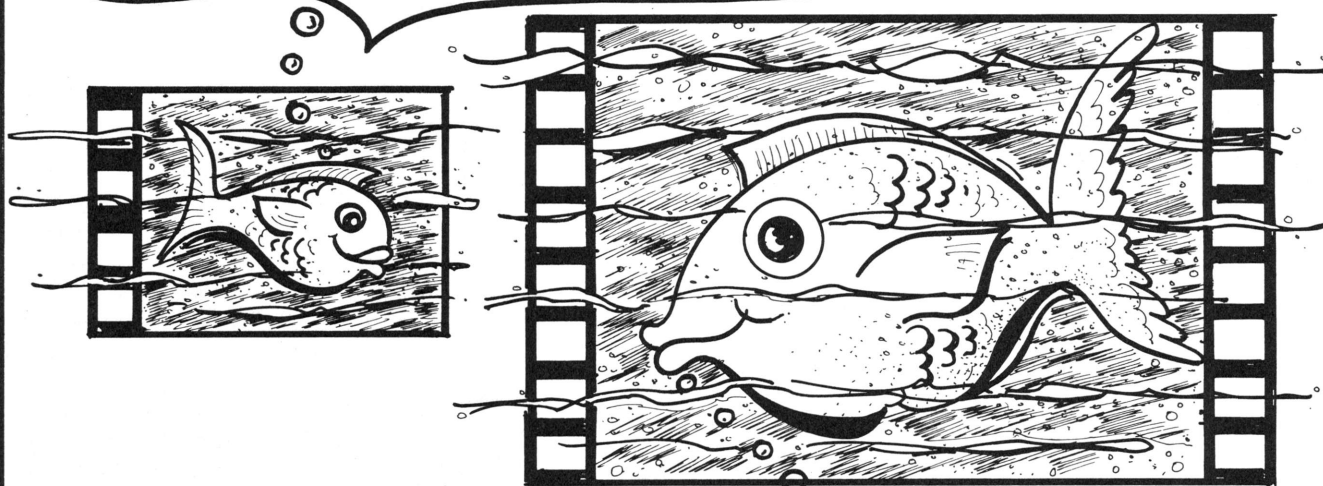
The computer had by this time printed-out paired drawings of the ship for left and right-eye views. A drawing unit called a "Watanabe" (named after the Japanese person who invented it) traced the image with a pen onto pegged animation paper. These line drawings were xeroxed onto sheets of clear cellulose (also pegged correspondingly). The computer was not involved in the cel coloring process at all.

"There are many things you can do with video that you can't do with film, and that's one of them," remarked Sparey.

Now came the painstaking process in which cels were hand painted on the back to add color and

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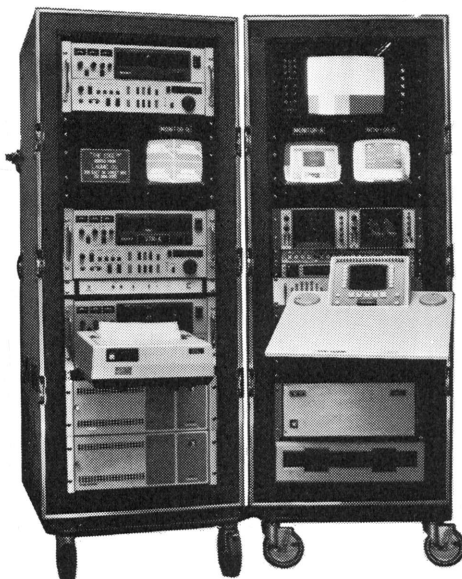


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opaque the image. Beyond this point, the computer was no longer involved in the animation process. Now everything went through the normal animation channels, right? . . . Wrong! Nothing is normal when 3-D's in the picture.

The 3-D process employed is the 2-perf left-eye top, right-eye bottom system premiered by Spacevision 4-D in 1966. A single camera fitted with a dual optical lens stacks the right-eye/left-eye views on top of one another on a single frame of film. This same lens combination later projects the images through polaroid filters onto a silvered lenticular auditorium screen, and viewers wearing corresponding polaroid filters over their eyes perceive the dual images as one, seeing within the picture the illusion of "depth."

To create this double-divergency image for *Star Chaser*, a half-frame aperture plate was manufactured specially for their Acme camera. All of the camera movements has to be based on a center to center position which meant that the half-frame plates had to be centered in the full standard "silent" camera aperture position.

The crane operator shot all the multiple passes for the left-eye images first. These included foreground and background artwork, effects animation such as explosion and laser fire, and any backlit hold-out mattes required. Then the film was rewound to the beginning, shifted 2-perfs in the gate for the correct top-bottom imaging factor, and identical passes were made for the right-eye images.

"For most of the ship animation we didn't go for paired images because of the extreme distances involved in space flight," continued Sparey. "When thinking in true 3-dimensional viewing, the human eye cannot differentiate between left and right-eye views beyond a distance of 100 feet. So there's no point in doing paired drawings beyond that. Also, we wound up eliminating a great many paired drawings for closer views because they were often too close to make any difference.

"Much of our depth divergence we got from mechanical bar shifts on the east-west pan controls of the camera crane. We'd shoot one image, back up the film, and then shoot the other with the artwork displaced accordingly. We taped backgrounds to

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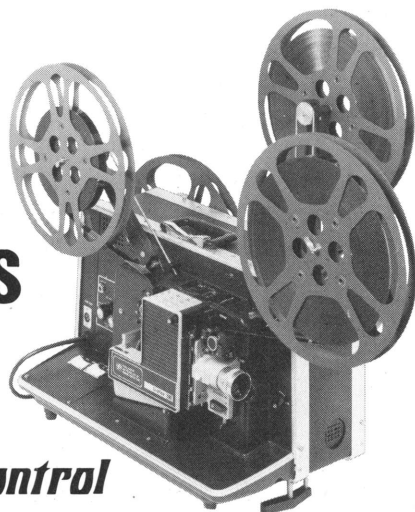
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the camera bed and created varying divergences for left and right eyes by shifting the bars by various increments. On a pan scene we were limited to four bar movements, but we found we could tape additional levels to a bar with pre-planned divergences so that we could get more than four levels of depth. This, by the way, is only on static panned elements, and not animated artwork."

But what about the backlash or gear slop encountered in even the most sophisticated animation cranes? Was the accuracy of each pass as important as the kind necessary in the most intricate motion control work?

Explained Sparey: "When returning to the start position between left and right eye takes, the cameraman would overshoot the zero-point from where the first move began and then pull back to zero to help compensate for any slop in the gear mesh. Most of our paired shots were pretty accurate. We did get some slippage, but that we found was more a result of human error than equipment malfunction."

Because there were often a variety of camera passes necessary for each paired drawing, a number of scenes were shot bipack - the technique of sandwiching two strips of film in contact in the film gate with the aid of a twin magazine arrangement. One load contained the original negative, the other a high contrast holdout matte. This was used for scenes in which the background had to be added separately, such as views from inside the Star Chaser cockpit of the ship traveling across landscapes. Also battle sequences involving explosions and laser fire (which are both bottom-lit elements occurring at different divergences) had to be added via multiple camera passes.

Sparey defined a typical *Star Chaser* shooting sequence: "Say we have one ship chasing another across a landscape accompanied by laser fire and explosions. We'd shoot a background pass, a foreground pass, a bottom-lit matte from the background elements for the bipack, plus a separate pass each for the effects animation of lasers and explosions. Then we'd rewind it, shift it 2-perfs, then shoot everything for the right eye, praying there weren't any mistakes."

Live action functions such as blue screen traveling mattes proved unnecessary when working within the precise frame-by-frame structure of cel

animation. Negative and positive mattes were obtained by rephotographing bottom-lit foreground artwork, then developing that hi-con latent film image for negative or reversal processing. If an object needed to go behind something, they'd simply use the actual artwork as its own matte. Of course, this technique, the cel must be handpainted on the reverse side so that an opaque black bottom-lit image is possible.

Virtually everything was drawn and painted in Korea. Cels drawn here became necessary for last-minute color coordination. Some peripheral shooting in Los Angeles was also required to meet the summer release deadline. Beyond the stages of layout and animation direction, they originally intended to draw and photograph everything in Korea to keep down costs. There were times during production when animation units were set up in Hollywood. A number of Americans were sent to Korea to coordinate and control the work being done there. One of these, as already mentioned, was John Van Vliet.

Van Vliet's former credits include *The Empire Strikes Back*, *Raiders* and *Tron*. He recently opened his own effects company, Available Light Limited, in North Hollywood with partner Kathryn Kean.

Concerning *Star Chaser*, he had this to say: "Character animation was already completed so we drew explosions, fire, lasers, etc. It was like doing live action except we had the characters already there and didn't have to rotoscope anything.

"The camera end of it was sort of a nightmare. The 3-D was like doing two films at once because you had to do a left and a right-eye version. But, by the time we finished doing some of the multiple passes it felt like four films!

"The interesting thing about doing effects in 3-D is that image resolution is so amazing. Grain is virtually eliminated because two things are combined on screen, the random grain pattern of one filling in the random grain structure of the other." Vliet is, of course, referring to a concept similar to double-printing – a technique used in process work to decrease grain in the projected background plate. The wide-screen Cinemascope-like 2-perf image is roughly equivalent to the resolution

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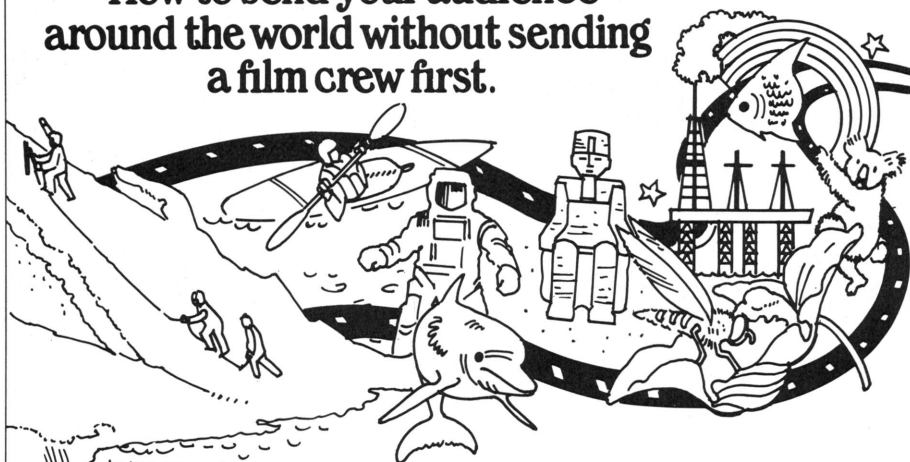
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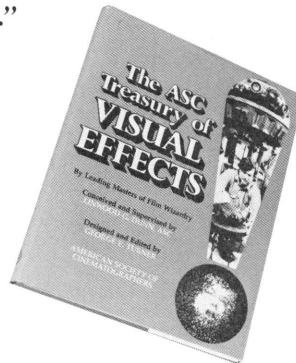
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found in a frame of 16mm film. But, the overlapping aspects of 3-D fill in this rather coarse grain structure.

Sparey related another advantage with computerized 3-D over that of other 3-D camera systems. "In our picture, when we have animated figures moving in depth, we can continually change the divergences on them as they travel forward or backward in the scene. This is so they stay in accurate relationship to the depth of the elements surrounding them. Using a floor plan, lines converge to a vanishing point perspective. We can then measure across any given point for the amount of divergence necessary at any distance along that floor plan so that when a figure reaches that point we can give him a divergence that corresponds with the floor's depth he has come in contact with."

This "depth planning" was achieved basically by what Sparey calls "railroad track perspective." When looking down a length of railroad track, spectators can mentally determine where objects should be relative to their size and distance. "It's somewhat along the same theory as the telegraph poles along side the track," he observed. "The farther away they go, the less difference there is in divergence between them until you reach the horizon point. So, you have a very large divergence on foreground elements, and very small amounts for objects off in the distance. These all must be carefully controlled or characters will mismatch relative to the scale of actual objects around them."

In an art medium like animation, the animator is in total control of all elements. Sparey's crew planned the picture so that virtually all the action occurred at a comfortable distance beyond the picture window of the screen frame. Because of convergence problems, they did not want any held elements to fall beyond the picture frame at any distance closer to viewers than the screen, since 3-D cuts them off in a very peculiar fashion. In a 3-D picture, one is forced to obey certain laws, namely: "Thou shalt not touch the screen edge with an object suspended over the audience." Once this happens, the brain says an object at screen edge cannot be any closer than screen edge. Hence, the 3-dimensional illusion is destroyed.

Thus, virtually everything in *Star Chaser* occurs at a position between the screen plane and the horizon. "We tried to hit a very comfortable zone," concluded director Hahn. "A number of 3-D live action features that relied on special effects, strained human eyes too much causing headaches when things were stretched to the limit. So, we tried to limit our film to a rather comfortable range of distance."

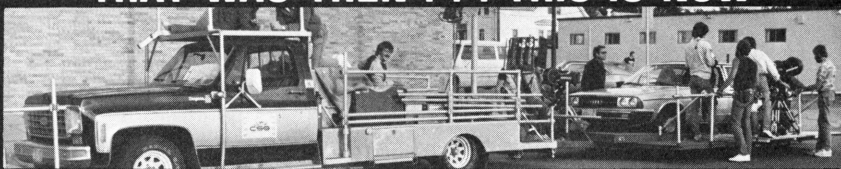
Sparey offered another more important factor which limited the degree of close-ups. "When we tried to have things come out at the audience, we discovered that laser beams normally go to either side of the viewer; they don't form a single beam coming at you. For images with strong contrast (like laser beams), the 3-D polarizing material does not mask the total elimination of the second image for either eye." Hence, the eye sees a double image, a problem encountered often in the 3-D version of *Spacehunter: Adventures in the Forbidden Zone*.

The bulk of these camera effects were accomplished in-camera with bottomlit color filters to achieve a crisp first-generation look. To meet the release deadline, some scenes were shot separately for later optical compositing to accelerate camera time. No multi-plane was used, although bipack served as a substitute to some extent. It allowed Sparey's crew to obtain more depth levels than was normally available on the standard animation crane arrangement.

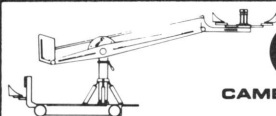
Shadows on objects were also kept to a minimum. This not only would have entailed extra work in the painting stage, but would add further time and effort when computing divergences, a luxury the project could not afford. "In live action, objects approaching viewers tend to go into shadow," recalled Sparey, "forming a blur which makes them a little easier to imagine going by." As pointed out earlier, sharp, hard-edged, contrasty images do not help this illusion.

"We were pleased to discover that fully animated figures moving within 3-dimensional surroundings did not look like flat images," he added. (Recall the former cutout look on earlier 3-D animated films of the '50s.) "This was just a fortunate accident. We obviously couldn't draw paired elements with rounded shading for each object.

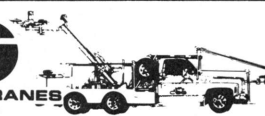
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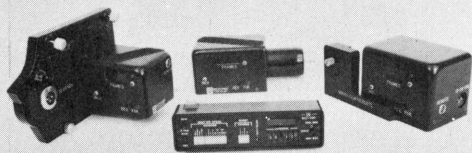
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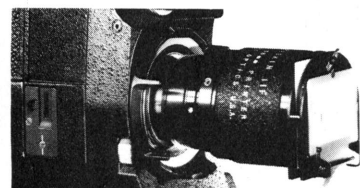
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That gets very tedious and adds a few years to the production time." Fortunately, the computer was able to give an accurate representation of any object in its memory and from any point-of-view desired. It was programmed to give the 2 1/2-inch eye displacement between left and right eye for each drawing it printed out.

But any animated film, whether presented in 2 or 3-D is ultimately judged by the pacing and construction of its story, the warmth of its characters, the style of its animation. According to Sparey, a former rotoscope alumnus of the Ralph Bakshi school of animation: "Ralph got to the point where everything he did was rotoscoped. Thankfully, there's none whatsoever in this film.

"The overall level of animation is very good. However, there are a few rough spots. But, artists got surprisingly good at doing paired drawings for a number of the background set-ups that weren't done by computer. Basically, these were architectural set-ups consisting of straight lines which could be handled fairly conveniently. Some of our most satisfactory paired drawings were done by one layout man who's blind in one eye."

"Since there hasn't been an animated film of this magnitude before," Hahn added, "we really had to work from scratch. There was no previous road map to follow. We had to work on it scene by scene, making sure it was in correct 3-D perspective from the screen to infinity. The 3-D aspect doubled the amount of shooting required. There were often mistakes, some requiring retakes that normally wouldn't have been necessary on a flat animated picture."

Considering the scope of this ambitious undertaking, and the demands of the 3-D technique, it must have seemed comparable to making two films at once. The medium of cel animation created problems well beyond those of an ordinary 3-D live action feature, since one is dealing only with 2-D images. One still wonders how real and dimensional a cartoon image can ultimately look. Will the flat painted colors make it seem like we're trapped inside a giant viewmaster of old? △

Les Robley is a technical writer who regularly contributes to these pages.

DUPLIKIN III

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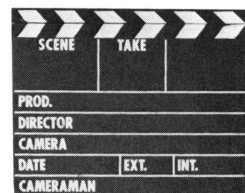
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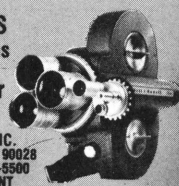
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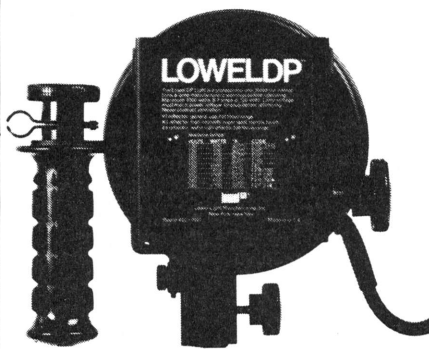
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In Memoriam

Floyd Crosby, left, receiving the Golden Globe award from Henry Escobar, 1953.

Floyd Delafield Crosby, ASC, a versatile cinematographer whose credits include *Tabu*, *High Noon* and *House of Usher*, died September 30 at his home in Ojai, California. He had been in declining health for about a year. Crosby was 85.

Born December 12, 1899, in New York City, Crosby worked at the stock exchange on Wall Street and studied at the New York Institute of Photography. A meeting with Prof. William Beebe, the oceanic explorer, led to a job as apprentice photographer on the Beebe Haitian Expedition, photographing undersea life. In 1930 he went to Tahiti with directors Robert Flaherty and F. W. Murnau to film *Tabu*, a nature drama with a native cast. Crosby won an Academy Award (1930-31) for the Paramount release, a masterpiece despite the incompatibility of the directors and the resignation part way through production of Flaherty.

For two decades Crosby specialized in documentary films. He filmed the Matto Grosso Expedition, the Pratt Honduras Expedition, the LaVarre Brazilian-Guiana Expedition and an Indian Expedition for Paramount in rapid succession. In 1934 he photographed *Pueblo*, a story of Indian life in New Mexico. He teamed with Pare Lorentz to make *The River* and *Fight for Life*, with Joris Ivens for *The Power and the Land*, and with Flaherty for *The Land*. In 1947 he photographed *My Father's House* in Israel.

Director Robert Rossen wanted a realistic but artistic look for his picture *The Brave Bulls* (1951), and Crosby provided it in one of his first ventures into mainstream features. Shortly afterward he was hired by Stanley Kramer and Fred Zinneman to photograph his most celebrated picture since *Tabu*, the "adult Western" *High Noon* (1952). "Before starting the picture, we agreed that we would do nothing to make the photography pretty,"



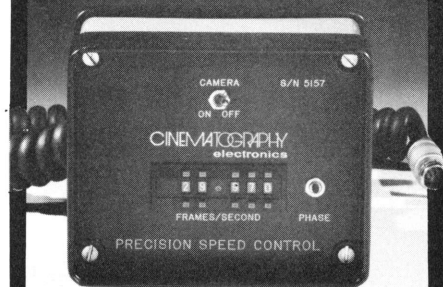
Crosby said. "We wanted the feeling of a hot, stark, small western town. I did not filter the skies as we felt that white skies would add to the feeling of heat. We also had the print made a few points lighter than normal to add to the effect of heat." Crosby was awarded a Golden Globe for *High Noon*.

Ironically, Crosby spent many years photographing very low budget pictures for Roger Corman. These included *Five Guns West*, *Apache Woman*, *Attack of the Crab Monsters*, *War of the Satellites*, *Machine Gun Kelly*, *Rock All Night*, *I, Mobster*, and *Teenage Caveman*. In 1960, Corman announced that he was upgrading his product beginning with a series of color films based on stories by Edgar Allan Poe. These were filmed in grand style by Crosby and included *House of Usher*, *The Pit and the Pendulum*, *The Premature Burial*, *Tales of Terror*, *The Raven* and *The Haunted Palace*. He had more than 80 feature credits when he retired in 1965.

Crosby was a member of the Air Force Transport Command during World War II with the rank of major. He flew more than 200,000 miles while making reference films for pilots.

He is survived by his wife, Betty; two sons, David (well known rock musician) and Ethan, and his sister, Mrs. John Gregory. △

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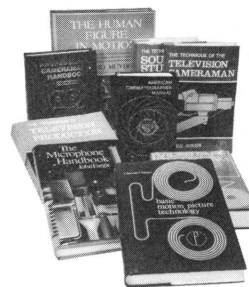
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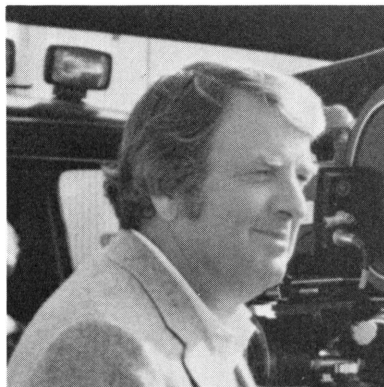
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From the Clubhouse

Bradley B. Six, ASC



Bradley B. Six, who has been working in the film industry for 25 years, is one of two directors of photography newly elected to membership by the ASC. Six came up through the ranks working for such cinema masters as Jack Swain, ASC, Jerry Finnerman, ASC, and William Spencer, ASC. Son of still photographer Bert Six, his credits include *A Man Called Sloan*, *Barnaby Jones*, and *The A-Team*. Six's most recent assignment has been on *Trapper John, M.D.* for 20th Century Fox.

Also recently voted to membership in the ASC is director of photography John Charles Hora. Hora first garnered notices for his work on *The Howling* in 1980 and in continued association with director Joe Dante, he has photographed a segment of *Twilight Zone: The Movie*, *Gremlins*, and the summer feature, *Explorers*. Hora is a California native and a graduate of the USC film school. Originally given the chance to do screen writing, Hora turned down the desk in favor of life behind the camera.

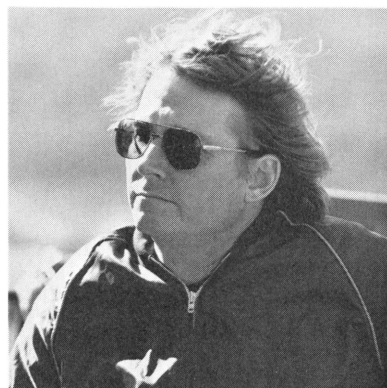
For the first time this year, the Nissan Focus awards included cinematography. Judges for the contest were John Bailey, ASC, Bill Fraker, ASC and Ray Villalobos. John Schwartz-

man and Robert Brinkman, both of USC; shared the \$1,000 prize for their film *The Last Chance Dance*.

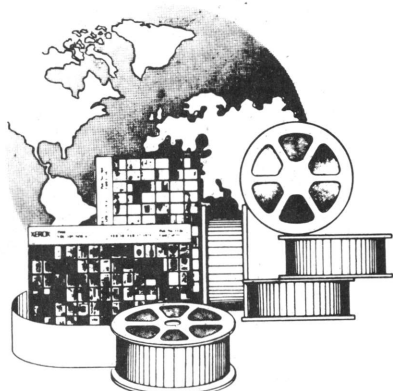
Leonard South has announced that the Seventh Gala Annual Affair for ASC members will be held at the Bel-Air Country Club on January 11, 1986. South is serving as chairman of the event this year.

Howard T. LaZare, associate member of the A.S.C., has been elevated to senior vice president, engineering for Deluxe Laboratories. He has served as vice president, engineering since May of 1984. Prior to that he was at Consolidated Film Industries. La Zare serves as the editorial vice president of SMPTE and is the recipient of two Class II Academy Awards.

John Hora, ASC



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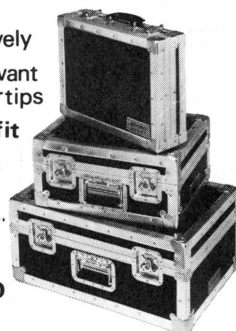
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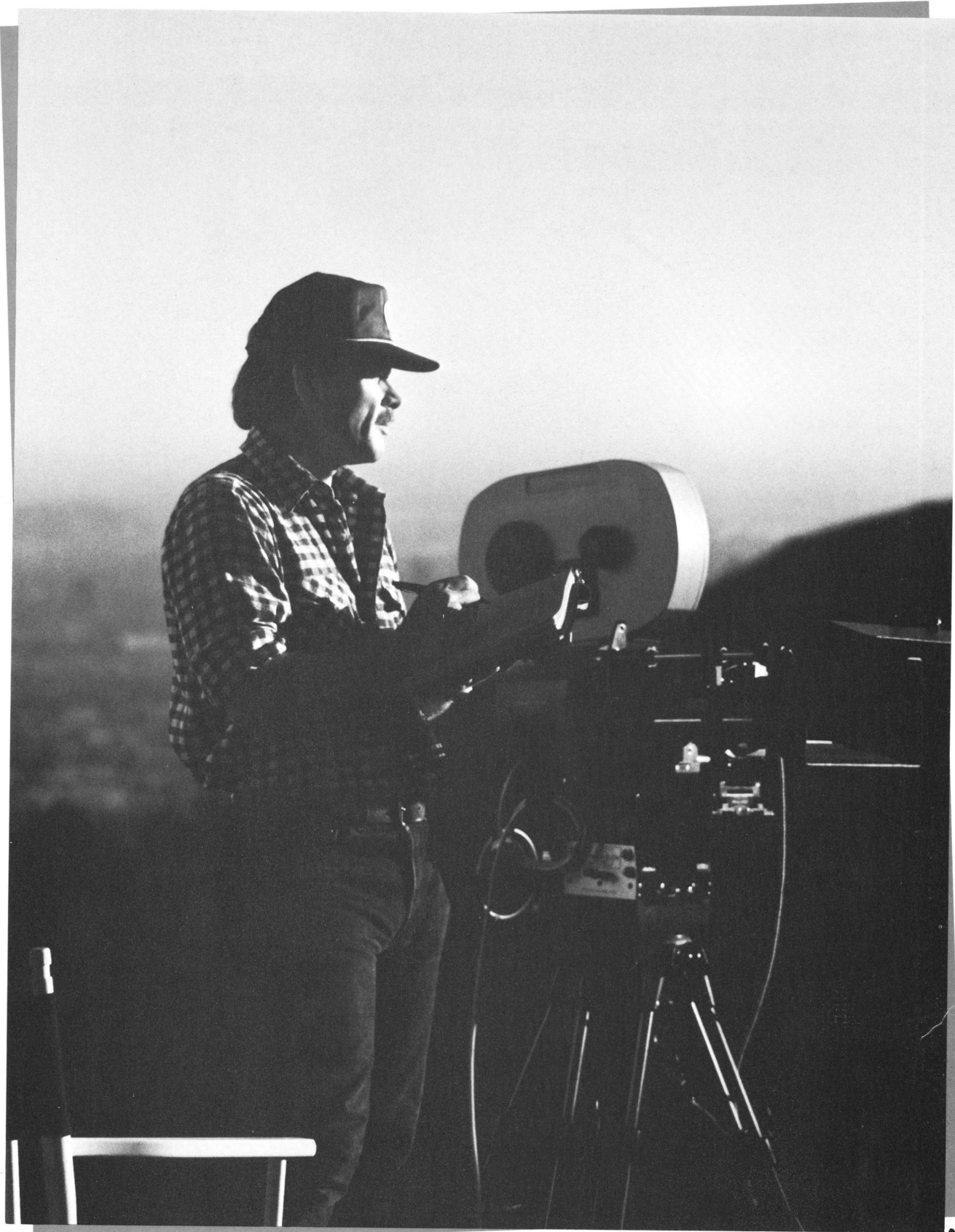
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